Vol. XLVII

MAY 24th, 1945

# FLIGHT

and

## AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

ONE SHILLING

MESSIER LANDING GEAR & ELECTRO-HYDRAULIC EQUIPMENT

MESSIER AIRCRAFT EQUIPMENT LIMITED . WARRINGTON

# HERCULES

*Parade of Britain's air power*

## *No 9.* Vickers "VIKING"

"VIKING"—civil aviation headline news for this week—appropriately takes its place in this series to give pertinent proof of an oft-repeated statement . . . "the single sleeve-valve will be the principle behind the power of the future." In powering the "VIKING," the "Bristol" Hercules sleeve-valve engine brings advantages of war-quickened research to the more pleasing prospect of civil air transport. Design simplicity, minimum maintenance, operational economy and consistent reliability are Hercules features which, vital in war, will prove invaluable in peace.

Bristol

*The single sleeve-valve principle was pioneered & developed by "Bristol"*

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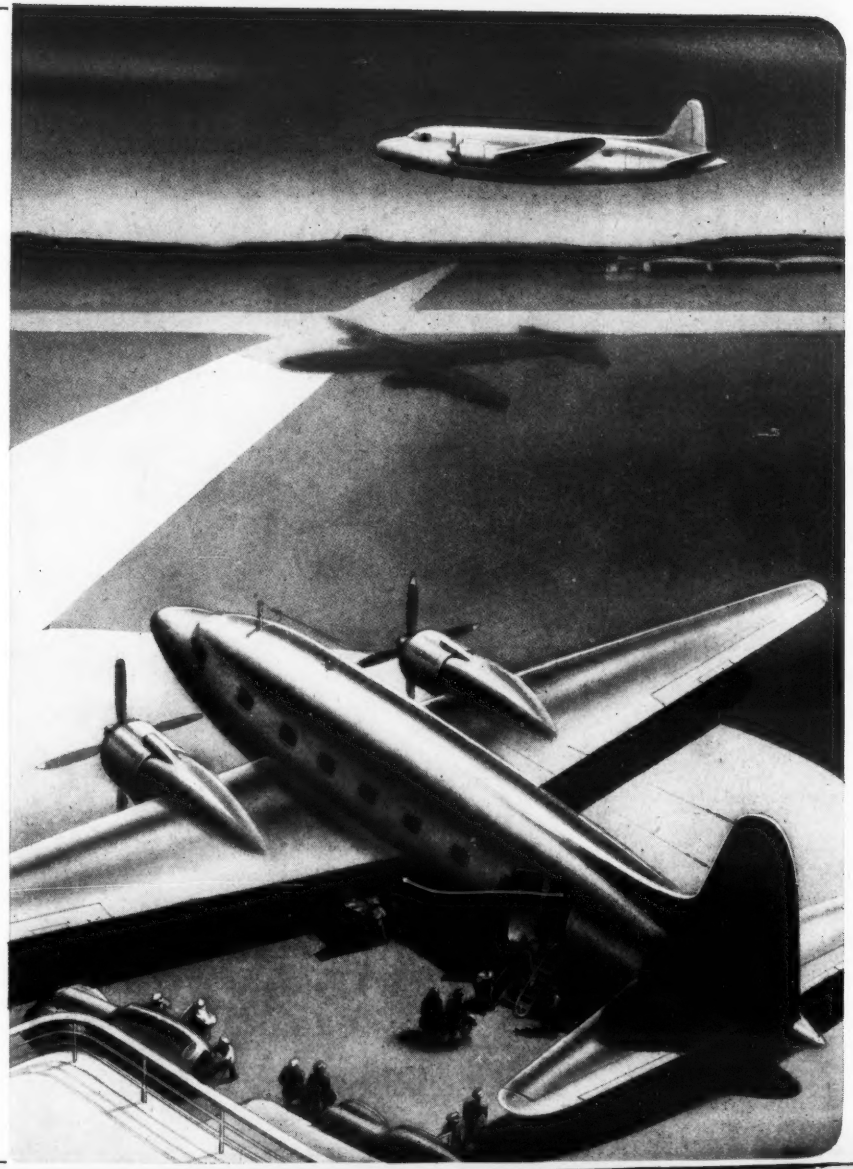

1945

# FLIGHT
and
AIRCRAFT ENGINEER

*First Aeronautical Weekly in the World : Founded 1909*

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# The Outlook

## Military Transport

AS recounted in this issue, a tremendous job of work has been done in supplying the 14th Army in Burma by air. But whether the supplies had been sent by pack mule, road transport, bullock cart, railway or boat, each form of transport would have found proportionate difficulties in keeping up supplies in such remote areas. Air transport had its particular difficulties in finding sufficient forward airstrips and in overcoming the local monsoon weather.

The point is, however, that we still marvel at air transport doing a serious job. This mental outlook must go. When the horse-drawn limber was replaced in previous wars by motor transport, there was something of the same wonderment. To-day we are just beginning to accept the air lorry as an accomplished fact. It requires no great stretch of the imagination to foresee the day when the majority of the Army and its equipment will be carried by air except in the immediate battle area.

Transport operation is the one aspect in which the Royal Air Force does not appear to have seen the picture clearly. In all other phases of air power it has excelled the world in both design and operation. We do not forget such aircraft as the Bristol Bombay bomber/transport, but only some 200 of these were built, and then mostly as a trial run for a contracting firm new to aircraft building.

Persistently a blind eye has been turned to military air transport, with the result that the best Britain can show of her own to-day are a few heavy bombers no longer required for their rightful occupation. It is common knowledge that there is an agreement whereby the United States build all the transport aircraft while we concentrate on fighters and bombers, but the trouble goes much farther back than that. We had not a good military transport aircraft in production or even contemplated when the war broke out.

The Dakota has done a wonderful job, but it is both unarmed and unarmoured. The bombers we use are both over-armed and over-armoured. Let us get down to a specialised aircraft for the future, because it is probable that Transport Command will be the biggest command in any future war.

## Bombing Airfields

THERE is nothing surprising in the fact that bombing is an art which has made a great deal of progress during the late war. All forms of attack regularly make progress during a war; not only because scientists devote their attention to them, but also because the fighting leaders realise that the weapons with which their side started the struggle often are not the most suitable for the purpose which it is desirable to achieve.

In the closing stages of the war in Europe we have all read a lot about the bombing of enemy airfields, and how this helped to put the *Luftwaffe* out of action. The latest instance comes from the Pacific, where Japanese aircraft, and particularly suicide bombers, have been causing considerable annoyance to both the American and British fleets. The Americans despatched a carrier force to deal with the nuisance, and for two days the ship-planes ranged over Kyushu and part of Shikoku. The result was a marked diminution of enemy bombing attacks on the Allied fleets.

If we cast our minds back to the early days of the war we may remember that when Norway was first invaded the R.A.F. made every possible effort to put Stavanger airfield out of action. We bombed and bombed day after day, and the fleet was also called in to shell the place and crater it extensively. All these efforts seemed to produce no effect on German air

superiority in Norway. It was very disappointing.

A few months later the *Luftwaffe* tried to put British airfields out of action, and this was also a failure.

The difference between then and now seems to have been made chiefly by the introduction of the fragmentation bomb. It does not waste its energies in making holes which can be quickly filled in. It damages or destroys all aircraft (and, incidentally, personnel) within a certain radius. So it now is definitely possible to make an airfield useless for some time (which may be a vital time) by bombing. Whether the idea of the fragmentation bomb was due to our scientists or to our tactical commanders we do not know, but it has had a considerable effect on the course of the war.

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## Efficiency

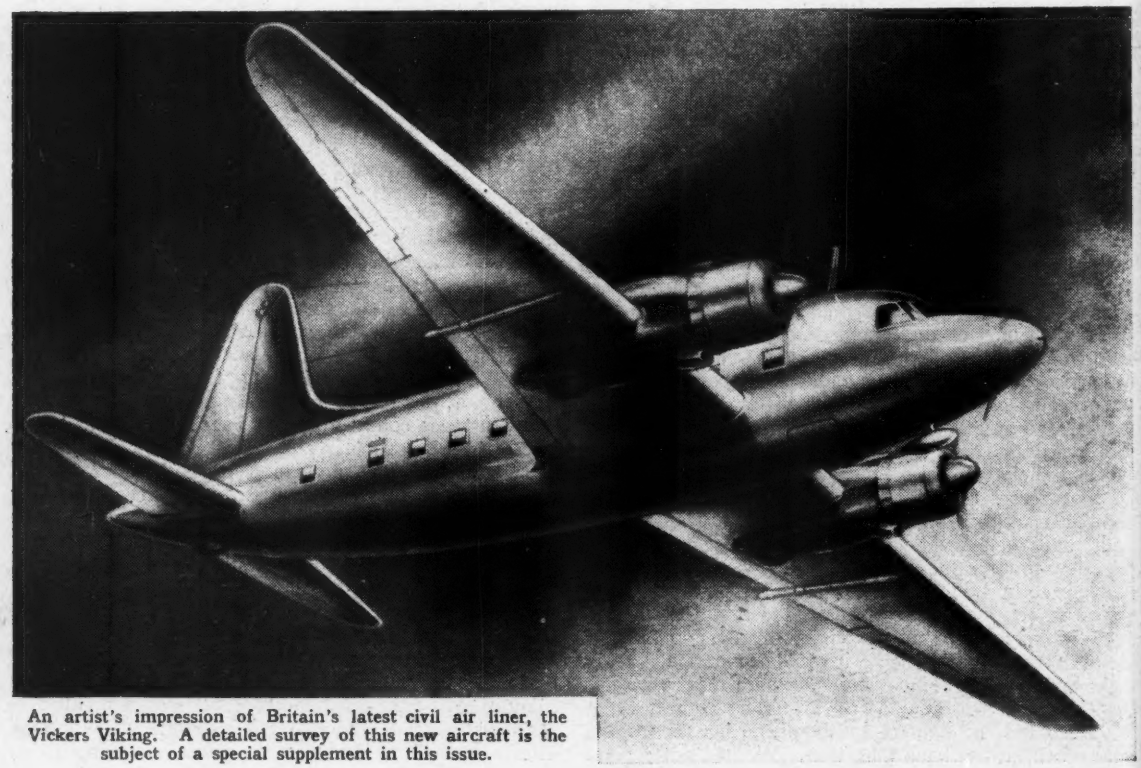
WHEN a new aircraft type makes its appearance it is always interesting to try to assess its efficiency. During the war this has not been possible because, for service aircraft, data on which to base estimates were not allowed to be published. It is otherwise with civil machines, but even here it is not easy to give simple estimates; too many qualifying statements have to be made if an accurate picture is to be conveyed.

Before the war we were in the habit of assessing structural efficiency on a basis slightly different from that commonly employed, which was, and is, to express structure weight as a percentage of the gross weight of the aircraft. Instead of that we chose the ratio of disposable load to tare weight. Our reason was that by so doing one obtains a figure which expresses the percentage of its own weight which an aircraft can carry as disposable load.

On this basis the new Vickers Viking, described in this issue, carries as disposable load 52.6 per cent. of its own weight, fully equipped. That is a very good figure. Aircraft flying in overloaded condition have carried more than their own weight as disposable load, but only at the sacrifice of take-off performance and subsequent climb, not to mention comfort for the occupants.

Aerodynamic efficiency is also of great interest. From the published figures it is seen that the Viking cruises at 210 m.p.h. at a cruising power of 1,800 b.h.p. Allowing for airscrew efficiency, this probably means about 1,400 thrust horse-power. On that assumption, the thrust, and consequently the drag, is 2,500 lb. at 210 m.p.h. Since the loaded weight is 33,000 lb., this figure gives a lift/drag ratio of 13.2 at cruising attitude. The maximum (at lower speeds) is probably even higher. Thus it may be seen that the aerodynamic efficiency of the Viking is also of a high order.

The figures given of ranges and payloads, combined with the consumption of about two miles per gallon at 210 m.p.h. and 2.5 miles per gallon at 160 m.p.h., indicate that in the Viking the operator will have an aircraft which combines economy of operation with good commercial performance.



An artist's impression of Britain's latest civil air liner, the Vickers Viking. A detailed survey of this new aircraft is the subject of a special supplement in this issue.

IT'S IN THE BAG : *Luftwaffe* delegates arrive at the Royal Naval Air Station, Drem, Scotland, by Junkers Ju 52, to hand over plans of German defences and minefields along the Norwegian coast.

# WAR in the AIR

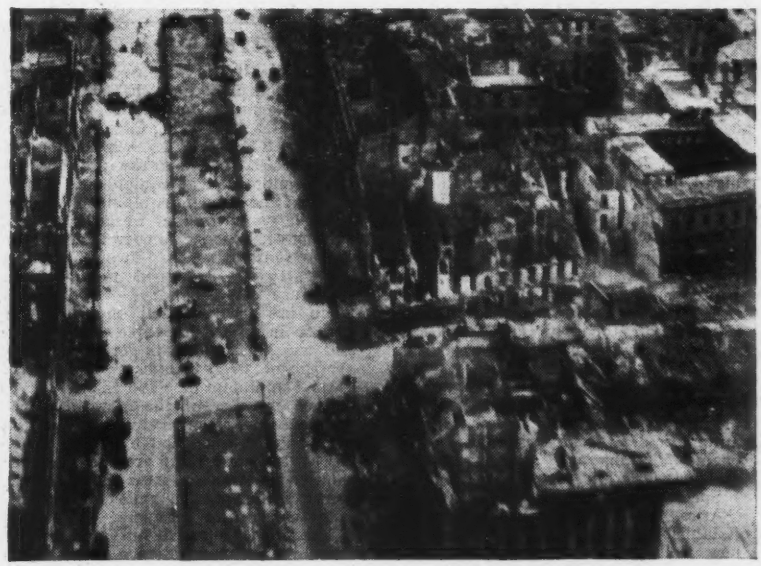
## *All Eyes to the East : Prospects in Malaya : U.S. Carrier-borne Aircraft Damage Japanese Airfields : Attacks on U.S. Fleet Reduced*

WITH Rangoon in British hands again, attention is drawn once more to the Malay Peninsula. At the time of our disaster there it was suggested that Hurricanes might have saved the situation for us if we had had enough of them and in time. Before long the situation will be reversed. The Japanese will presumably be trying to defend Malaya, but this time both sea power and air power will be on the British side. In the days of our misfortunes our land forces, too, were handicapped, because the regiments were not acquainted with the ways of jungle fighting. Some of the British units had been a bit too long in the country and were suffering from fever and other tropical complaints; while others had only just landed and had not had time to become acclimatised. The best of the Indian battalions had been trained on the rocky hills of the N.W. Frontier, where vegetation is sparse; and to them, too, the jungle was an unpleasant novelty. The Gurkhas were said to take to jungle fighting most readily; but Gurkhas are hillmen, and are not very good at standing great heat.

Now the Army which has fought its way from Imphal to Rangoon has very little to learn about fighting in the jungle. It has a magnificent Air Force to work with, and the two understand each other thoroughly. In addition, the sea is no longer dominated by the Japanese Navy, and if there is to be much landing behind the enemy's lines, it is the men under Admiral Mountbatten who are in a position to do it. We know a lot more about the employment of airborne troops than we did in the tragic days when we were driven out of Malaya and when Singapore fell.

After the liberation of Rangoon there ensued a period in which the main work was breaking up and mopping up the Japanese forces which were trying to find their way across the Shan Hills into Siam and Indo-China.

Bigger things were happening round the corner in the Philippines and off



OVER UNTER DEN LINDEN : A low aerial photograph of the ruins of the famous Berlin highway taken from a Mosquito of the R.A.F. Film Production Unit.

## WAR IN THE AIR

Formosa. The Allied object was to cut the Japanese communications down the China Sea and along the eastern coast of China itself between these Japanese home islands and the Dutch East Indies. While the Americans battled hard for the recovery of the Philippines, a British fleet which is strong in carriers, was busy neutralising the enemy's air link down the line of Ryuku Islands The British fleet has sent swarms of Corsairs, Hellcats, Avengers, and Fireflies to attack airfields from which the enemy might attempt to interfere with Allied operations.

The Japanese response has been a number of suicide pilots who have tried to crash their aircraft and bombs on the decks of the British ships. A number of them succeeded, though many were shot down by the guns of the fleet. These attacks are reported to have more moral than material effect. Nobody likes them, but the British crews endure them with steady discipline. So far no ship has been put out of action for more than a few hours. As a means of preventing the fleet from accomplishing its object they are certainly futile.

The Americans were prompt in dealing with this form of bombing attack on Allied ships. For two days they bombed the bases in Japan from which the pests used to take off, and at once a diminution in these attacks was noticed.

The munitions city of Nagoya has become a regular target for the Superfortresses, and it has been found that fire-bombs are a most effective way of bringing destruction to a Japanese town.

In this series of weekly comments on the war in the air there will be little more to write about doings in Europe. It will be pleasing to end with some account of the doings of the Royal Air Force Regiment. When Admiral Dönetz ordered the Germans in Denmark to surrender, small detachments of the R.A.F. Regiment were among the first Allied troops to cross the frontier. Together with airborne troops they were the first to enter Copenhagen, where their welcome from the Danes was tumultuous. These detachments also took possession of 15 German airfields in the country, and accepted the surrender of the German troops occupying them. The Regiment was also the first to take possession of Kiel.

In many cases the surrendering Germans largely outnumbered the R.A.F. infantry, and young Flight Lieutenants found themselves in charge of large airfields holding up to 5,000 Germans. In the first 48 hours the R.A.F. men had accepted the surrender of more than 20,000 *Luftwaffe* personnel and over 1,000 aircraft. They were glad when the 2nd British Army arrived to relieve them of their responsibilities.

**CAPITALISTS! Russian commanders showing Air Chief Marshal Sir Arthur Tedder and Admiral Sir Harold M. Burroughs over the ruins of the German capital.**

## R.A.F. POLAR FLIGHTS

A SERIES of flights over the geographical and magnetic north pole, between Iceland, Canada and the U.K., is now being undertaken by an expedition from the Empire Air Navigation School of R.A.F. Flying Training Command, based at Shawbury, near Shrewsbury.

The aircraft used is the Lancaster "Aries," which flew round the world in the course of a navigational mission to the Pacific last autumn and toured the United States, Canada and South Africa.

"Aries" is again captained by Wing Cdr. D. C. McKinley, D.F.C., A.F.C., who is in command of the expedition The objects of the flight are to study navigation in the conditions imposed by polar flying; to examine the behaviour of the compasses, radar installations and automatic dead reckoning gear; to collect engine handling and performance data and magnetic and meteorological data.

Special instruments were fitted to "Aries" at the Royal Aeronautical Establishment, Farnborough, and four new Rolls-Royce Merlin XX1V engines installed by the Repair and Inspection Squadron of the E.A.N.S. at Shawbury, where ground staff often worked eighteen hours a day in the three weeks before the flight began, including VE-Day.

For the first time "Aries" carries a medical observer, Wing Cdr. R. H. Winfield, D.F.C., A.F.C., whose concern before the flight was the provision of safety and survival equipment. Food, clothing and cooking equipment to maintain the party for four weeks is carried, although it is hoped to complete the programme in two weeks. Two members of the party are equipped to travel for assistance, if necessary. A four-day menu has been worked out to ensure variety in diet, with three meals a day and snacks, each man getting a daily average of 3,400 calories as against the normal minimum of 2,200 calories.

Each member of the crew of eleven has his own Arctic survival kit, and also emergency rations, and for the common use of the party there are such items as snow shoes, ice axes, snow shovels, rifles, Arctic fishing tackle and two portable radio transmitter receivers.

The aircraft left Shawbury and reached Iceland on the first stage of its flight last week. The airfields to be used at the various stops will be determined by weather conditions at the time.

## "THE MOSQUITO"

RESTRAINT is the keynote of the new film on the inception, birth and work of the Mosquito which the de Havilland Company has recently sponsored. It is a Cecil Musk production for the Film Producers' Guild, and traces the evolution of this famous aircraft from its inception, through its many guises and the spread of its manufacture, first among sub-contractors at home and later by associated de Havilland firms in Canada, Australia, and South Africa. Short sequences show methods of manufacture and assembly, including some from the overseas factories, and one gives a glimpse of the ease with which a damaged wing can be repaired.

Personalities from the firm are introduced, and will be readily recognised by aviation people, but there is no "build-up" such as would have been worked into a film by many firms. The Mosquito is allowed to speak for itself, and this it does right well in a series of magnificent shots by the R.A.F. Film Unit. The only person mentioned by name is Sir Geoffrey de Havilland, a little touch which is so very typical of the company. It is the team spirit that matters.

"The Mosquito" is by far the finest film of its kind we have yet seen.

# HERE AND THERE

ROUNDED UP: An Fw 190, its Nazi markings replaced by R.A.F. roundels, used by a Wing Commander after capture intact on its German airfield.

## Killed in Accidents

A list of 20 senior officers of all three Services who have lost their lives in air accidents while on duty was issued by the Air Minister last week. The list, which refers only to accidents involving R.A.F. aircraft, includes four officers who are missing and presumed killed.

## French Awards for U.S. Airmen

IN four ceremonies at U.S. Eighth Air Force stations in England recently, 23 *Legion d'Honneur* and 501 *Croix de Guerre* medals were awarded by Lt. Gen. Martial Valin, Chief of Air Staff in the French Air Force, to officers and enlisted men of the "Eighth" for exceptional military acts performed during operations in the liberation of France.

## Airfield Expert Dies

THE man who, in this war and the last, was responsible for the creation of 87 airfields, has just died. He was Mr. Claude Pierrepont Hunter, governing director of Messrs. James Hunter, Seedsmen, of Chester.

As a specialist in turf production, his services were called upon by the Government in 1914, and by the end of the war in 1918 he had seeded more than 30 airfields and acceptance parks. Later he evolved a technique of construction and surfacing so successful that a "hunterised" airfield became the recognised standard of good quality.

Lord Beaverbrook, when Minister of Aircraft Production, appointed him ground specialist during the present war, and he has been responsible for the construction of over 40 bomber runways and dispersal sites.

## North of the Border

AN M.A.P. report issued last week says that this Ministry has been responsible for building more new factories in Scotland than all other Ministries put together. In addition to 29 new factories —either built by the M.A.P. or in association with it—a further 11 factories were extended or converted.

Twenty-nine well-known concerns which, before the war, had no manufacturing interests in Scotland, were led north of the border, and of these only one has intimated its intention of giving up its Scottish interests.

The biggest single industrial undertaking in Scotland was the Rolls-Royce aircraft engine works near Glasgow, which, at its peak period of war production, employed 25,000 people.

A number of the new firms are engaged in the radio industry, and Scotland hopes to retain its place in this sphere of activity.

GO EAST, MY SUNDERLAND!: Depth charges, in a Sunderland's racks, which, the Atlantic task completed, will soon be dealing with Jap submarines. They slide out under the wings to be dropped.

## Basic Ration!

SIR ARCHIBALD SINCLAIR disclosed in the House last week that during the past 12 months the R.A.F. used approximately 10,250,000 gallons of aviation fuel per day in operations against Germany.

And added to that, presumably, will be a few odd gallons of lower-grade petrol used by their ground transport.

## Air Power Again

ANNOUNCING last week that the Chinese, fighting on their own territory, now had for the first time not only air support but air superiority, the Chinese Minister of Information at Chungking attributed the current victories over the Japs in Western Hunan to the co-ordination between ground and air forces and the close co-operation between U.S. and Chinese Forces.

## A.T.C. Boxing

THE first item on the programme of 17 contests in the finals of the A.T.C. Boxing Championships at the Albert Hall last week was the contest in the Midget class of the Junior group for the *Flight* Cup.

This was won on points by Cadet R. Dagnall, of No. 178 (2nd Blackpool) Squadron, North-West Command, who defeated Cadet D. H. Poole, of No. 169 (Plymouth) Squadron, South-West Command.

The boxing generally was of a good standard, that in the Junior group being especially keen. The finalists were, in

## HERE AND THERE

the main, well matched, as was shown by the fact that only one of the 17 fights was won by a knock-out. This was in a Senior group contest, when Cadet J. Williamson, of No. 2,093 (City of Manchester) Squadron, North-West Command, K.O.ed Cadet J. Sharpe, of No. 1,198 (Deptford) Squadron, London Command, in the Welterweight final for the Hillary Cup.

Mr. Quintin Hogg, Under-Secretary of State for Air, afterwards congratulated the winners and stressed the value of A.T.C. training and the Corps' important role in forming the R.A.F. in the future.

### Journalist Candidate

CAMBRIDGE UNIVERSITY is to be contested by an Independent Candidate in the person of Air Commodore E. L. Howard-Williams, air correspondent of the *Daily Telegraph*.

Chairman of the executive committee of the rapidly expanding R.A.F. Association, a member of the British Legion, and also chairman of the Guild of Air Authors, Air Comdre. Howard-Williams has spent eight of the last 30 years abroad, and has two sons, both squadron leaders in the R.A.F.

### A Veteran Retires

GROUP CAPT. R. H. HORNIMAN, for six years the overseer at Hawker Aircraft, has now retired and is to join the fire-extinguisher firm of Graviner, Ltd., but will continue as vice-chairman of No. 328 A.T.C. Squadron Committee.

Before going to Hawker, Group Capt. Horniman was attached to the Directorate of Research and Development at the Air Ministry, having proviously been a test pilot. He served in the last war as a pilot, and his only son, also a pilot, was killed in action in North Africa.

Group Capt. Horniman was the guest of the Hawker directors at a farewell dinner on the occasion of his retirement.

### "Cook's Tour"

FLYING in the heavy bombers which they repaired, serviced and generally cared for during the months of air assault on Germany and German-occupied territory, 27,000 members of the U.S. Eighth Air Force ground staffs have now enjoyed a series of "Cook's tours" over Cologne, Coblenz, Frankfurt-on-Main, Mannheim, and other German industrial targets

These tours have let the maintenance crews and other ground personnel see for themselves the results of the strategic bombing to which they made an important contribution.

### "Eighth's" New Chief

MAJ.-GEN. WILLIAM E. KEPNER has been appointed commanding general of the U.S. Eighth Air Force in succession to Lt.-Gen. James Doolittle, who is returning to Washington "for a new assignment," after having commanded this famous American force since January, 1944.

Gen. Kepner, who formerly commanded the Eighth's 2nd Air Division and before that headed the Eighth Fighter Group, was one of the pioneers in airship development and balloon ascents into the stratosphere. He has also served with the Marines. Infantry and Cavalry, and even (on detached duty) with the U.S. Navy.

**BARECREW : This crew of an R.A.F. Repair and Salvage Unit take their shirts off to the job when manhandling a Hurricane on the Mandalay front.**

### Australian Lancs.

AUSTRALIAN - BUILT Lancaster bombers will be coming off the production line by the end of this year, says the R.A.A.F. *Newsletter*, and the first will be delivered to the R.A.A.F. in January, 1946.

Tremendous planning and development work, with the co-operation of British and U.S. technicians, has been going on for some time to initiate the building of aircraft in Australia—notably the Lancaster and Mustang—and manufacturing plants are reported to be "geared for a stage of efficiency" for post-war civil production.

### F.A.A. in Australia

COMMANDER of the British Pacific Fleet, Admiral Sir Bruce Fraser, and Mr. Arthur Samuel Drakeford, Minister of Air and Minister of Civil Aviation, and other Ministers discussed recently the setting up of more stations in Australia for the Fleet Air Arm.

Some have already been provided, but the development of these and the formation of more is an urgent need for the British part in the Pacific war.

The Commonwealth Government regards efforts to meet needs of the Fleet Air Arm as one practical way of expressing Australian appreciation of the presence of the British Fleet in Pacific waters.

### Australian Magnet

MR. JOHN STOREY, director of the Beaufort Division of the Department of Aircraft Production, who has just returned to Australia after a six-months' survey of industrial conditions in the United States, Canada and Britain, said that he was impressed by the enormous number of British people who were anxious to go to Australia after the war.

From all sides they wanted to know what were the prospects of getting there. Enquiries came from executives of the highest status and from mechanics.

Mr. Storey said that industrialists should take a prominent part instead of leaving it to the Government, as private enterprise could do a great job in absorbing these people.

### In Brief

YOUNG flight-lieutenants with a mere handful of men of the R.A.F. Regiment sometimes found themselves responsible for big air bases, staffed by as many as 5,000 officers and men of the *Luftwaffe*, which surrendered to them in Denmark and Schleswig-Holstein.

* * *

R.C.A.F. headquarters has announced casualties from September, 1939, to VE-Day totalling 21,423 in all categories. These include 6,318 killed or died, and 3,031 missing.

* * *

Sir Frank Tribe, formerly Permanent Secretary to the Ministry of Fuel and Power, has been appointed Permanent Secretary to the Ministry of Aircraft Production in succession to Sir Harold Scott, now Commissioner of the Metropolitan Police.

* * *

No. 603 City of Edinburgh Squadron, which brought down the first German raider over British territory and latterly attacked V2 targets, has returned home.

* * *

U.S.A.A.F. flight engineers on B-29 Superfortresses have had their status raised by a longer course of training which places them on a level with pilots and navigators and leads, for the first time, to a commission.

* * *

The 1945 Delegate Conference of the Aeronautical Engineers' Association will be held at the Eccleston Hotel, Victoria, London, from June 4th to June 9th.

* * *

Messrs. C. H. Chichester Smith, D.S.C., A.F.R.Ae.S., and C. C. Vinson, A.C.A., have been appointed joint assistant managing directors of the Fairey Aviation Co, Ltd.

* * *

Mr. F. L. Hallard has joined Suflex, Ltd., as Northern representative and is working from the Manchester office at 2, Brazil Street, Manchester, 1.

* * *

Mr. S. H. Thorpe, A.R.P.S., is to read a paper on "Photography Applied to Research in the Steel Industry" at a meeting of the Association for Scientific Photography to be held at 7.30 p.m. at Caxton Hall, Westminster, to-night, May 24th.

# Combat Cargo Task Force

By
CHARLES GARDNER,
Sqn. Ldr., R.A.F.

## *"The Biggest Logistical Nightmare of the War" : Supplying the 14th Army in Burma : 2,200 Tons and 1,600 Troops Transported Every Day*

THE fall of Rangoon brings to an end—for the moment at least—one of the most amazing sustained air campaigns of the war.

Since last May—that is for exactly 12 months—the whole of the British 14th Army, fighting its major actions down the length of Burma, has been supplied and maintained almost exclusively by air. From the edge of the Imphal Plain and throughout its 1,300-mile advance to Mandalay, the 14th had practically no other life link with its supply bases and its ports than the fleet of R.A.F. and American Dakotas upon which it depended for its bullets, its petrol, its guns, its ammunition, and even its men.

There have been many air-supply feats in this war which have achieved great publicity—the Arnhem lift was one—the food-dropping to the Dutch in recent weeks was another. But none of these operations bears any comparison with the enormous and sustained effort of the Dakotas of Eastern Air Command.

At the climax of this great air lift in March, the Dakotas carried to the 14th Army 70,000 tons of supplies, 48,000 troops, and evacuated 16,000 wounded. This works out at approximately 2,200 tons and 1,600 troops transported by air on the Burma Front each and every day.

I have just come back from Burma and, while I was out there, I saw something of the air and the ground organi-

*WITH the end of the war in Europe, the centre of interest moves to the East. Japan is now alone against the might of the Allies, and air war will play its part, as it has done in the West, in bringing defeat to the enemy. For more than a year, the British and American Air Forces have been doing splendid work in Burma, and without them the 14th Army would still have been far from Rangoon.*

*Sqn. Ldr. Charles Gardner has just returned from Burma, and we have been fortunate enough to arrange for him to write a series of articles on various aspects of the Burma campaign, the first of which appears herewith.*

Indians loading a Dakota with ammunition and stores to be flown to a forward airstrip. The wide doors make loading or discharging comparatively simple

EITHER THIS: An assortment of baggage, tents, tin boxes, buckets and chickens await air lift to an airfield in another area.

## COMBAT CARGO TASK FORCE

sation needed to carry out this vital task. But before I go into details it would be as well to show why this enormous air-lift organisation became necessary, and why, without it, the 14th Army would probably still be no nearer Rangoon than the edge of the Imphal Plain.

During the whole of the Burma Campaign which has just ended, the 14th Army's nearest port and big land base has been at Calcutta—a city which is 800 tortuous miles from the nearest point of the fight against the Japs (Kohima) and subsequently became nearly twice that distance away as the British troops advanced. The next nearest port, and the only one which could bring relief to the "Q" side of the Army, was Rangoon, there being nothing between Calcutta and Rangoon from which supplies by land could be drawn. True, there are ports on the west coast of Burma—Chittagong, Akyab and Ramree are three of them—but none of these ports has roads or railways leading over the mountains into Central Burma.

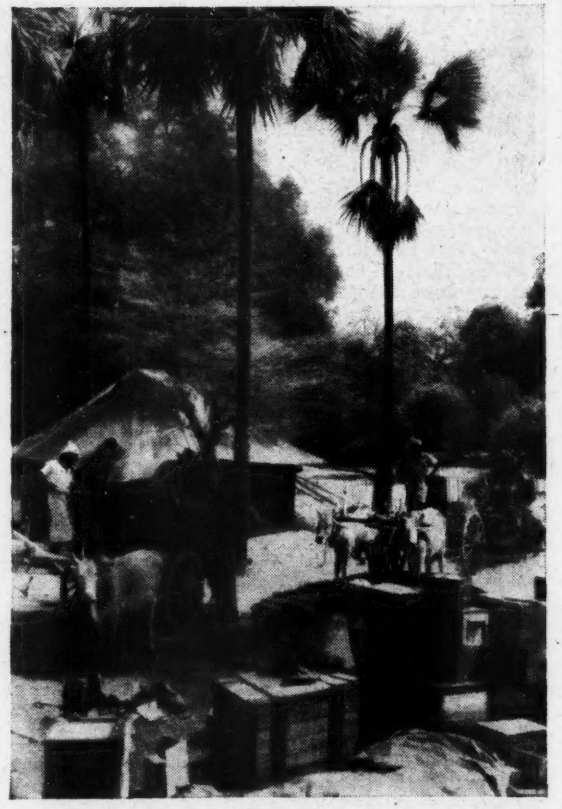
### The Problem

When he was appointed Supreme Allied Commander of South East Asia, Admiral Mountbatten inherited this problem, one which he himself described as "the biggest logistical nightmare of the war." It was obvious to everyone that the thin and tenuous land link from Burma to Calcutta, swept as it was for six months of the year by the monsoon, could not possibly sustain an advancing army. As I have said, there could be no relief, but only a steady aggravation of this unhappy state of affairs until the capture of Rangoon. Yet, if we were to fight the Japs out of Burma, the problem had to be solved.

To the air-minded the answer was obvious:—air supply!

For the first time the whole strategy, as well as the tactics, of a major land war had to be shaped to fit air power, and it depended entirely on air supremacy. From the moment that this basic fact became clear, South East Asia Command started collecting Dakotas. Very gradually, and in competition with the demands from every other theatre of war, a Dakota force was built up—at first to supplement rather than to replace the land routes.

It was this Dakota force, still in its infancy, that maintained the surrounded 7th Indian Division in action in Arakan in February of 1944. It was its first try-out on a



OR THIS: An R.A.F. signals unit transporting their equipment by bullock cart. Everything goes by air, road or water. There are no railways and very few roads. The employment of air transport saves untold weeks of travel.

# COMBAT CARGO TASK FORCE

large scale and, although limited to parachute drops, it was successful. The Japanese attempt to dash up the coast towards India was frustrated. The method of parachute drop and the ground organisation needed for collecting and distributing the supplies had, in fact, been tested-out earlier with the first Wingate expedition and later at Tiddim, where the garrison at this important outpost was kept going by six Dakotas which came over every day, whatever the weather.

In these early days No. 31 Squadron, R.A F., and 2nd Troop-Carrier Squadron, U.S.A.F., were the pioneers, and round them a body of experience was gradually built up, meeting and attacking the great flying difficulties involved and also the complementary problems of the Army Quartermaster.

### Research Centre

Training and experiments in the use of transport aircraft were carried-on at the Airborne Forces Research Centre —an inter-services unit located in the Punjab—which worked with its eye on the future enormous development of air transport on the Burma Front.

The basis of the Army organisation was, and is, the Air Supply Company with its depots either next to or on the base airfields. The origin of this Liaison Unit may be traced to the improvisations of the Royal Indian Army Service Corps, whose original efforts were so sound that by the beginning of 1944 their idea of the Air Supply Company had developed into a formidable organisation. There were, at the time of the Arakan crisis, five or six of these Companies working—all with subordinate sections for storage, packing, signals, supplies and loading, and with the responsibility for keeping in touch with the Army requirements, the civilian railway people, the transport squadrons and the field troops.

**THE CAPTURE OF RANGOON:** (Top) This fantastic pattern was made by the abandoned parachutes of the airborne force dropped on 1st May. (Bottom) An air photograph of part of the Fleet assembled at Ramree for the assault on Rangoon.

When urgent need for an air lift into Arakan arose in February, 1944, the two original Dakota Squadrons had expanded to eight—four British and four American—and these were reinforced for the actual operation by some Curtiss Commandos which had been lent by the India-China Wing of the American Air Transport Command.

Almost immediately after this first large-scale and successful try out in Arakan the Dakotas, which were now grouped together and called "Troop-Carrier Command," faced a task which stretched their resources almost to breaking point.

The Japanese, frustrated by air supply in their Arakan offensive, launched a much more formidable attack at India through the Imphal Plain and at the Bengal-Assam Railway north of Kohima. This attack had initial success, with the result that the whole of four Corps of the 14th Army was surrounded at Imphal, and cut off from any land communication with Calcutta.

An urgent meeting of Commanders was held to organise the necessary air supply, as it was of paramount importance for the safety of India that Imphal be held. It was agreed that the daily tonnage requirements of the encircled units should be stabilised at 540 British tons per day. To fulfil this demand Troop-Carrier Command still disposed of only eight Squadrons, by far the greater proportion of which had already been committed to the maintenance of Allied Forces on other sectors of the Front—noticeably General Wingate's 2nd Expedition. In addition they also had a few Commandos which had been borrowed from the Americans, and which had not yet been returned.

There is no room in this article to go into the heart-aches and headaches of the next three months. Many things, not the least of them being the weather, hampered Troop-Carrier Command, and quite often it was not possible to bring in the daily tonnage agreed at the first conference. The situation became grave but, by the end of March, six more Dakota Squadrons—five American and one British—were lent from the Middle East. These Squadrons, together with the eight existing ones, flew in appalling weather over the mountain ranges, and it is largely due to their gallantry and persistence that by mid-June the air supply corner was turned. By this time, thanks to the air lift, the ground situation had improved, and it was then

## COMBAT CARGO TASK FORCE

obvious that the Japanese were headed for disaster. By June 22nd, the Kohima Road, from the Railway to Imphal, was reopened by a relieving Force of 33 Corps, and by the end of the month the weight had been lifted from Troop-Carrier Command's shoulders.

It had been touch and go—how nearly so only the full history of the operation can recount—but it was obvious to all who were following this Front that the new strategy of air-supplying an Army could and would work.

It has always seemed to me to be odd that the Japanese Higher Command did not realise this from the word "go." The writing was on the wall from the first Wingate expedition, and was put up in particularly large letters in Arakan. Yet only a matter of weeks later Jap ground forces were embarking upon an operation of encirclement when they had practically no air power, and when they knew we were in a position to maintain our garrisons from the air. The defeat they sustained as a result is one from which they never recovered in Burma, and it is true to say that the Battle for Rangoon was really won on the Imphal Plain.

It is interesting to note that during the Imphal operation Troop-Carrier Command was used not only to bring supplies to Imphal but also reinforcement troops. One Indian Infantry Division was flown up complete from Arakan to Imphal and another to 33 Corps. In addition the 2nd British Division was flown to 33 Corps from the far side of India where it was training.

After Imphal, Troop-Carrier Command had something of a breather. True, it still had commitments—notably the air supply over the monsoon-covered mountains to the 5th Indian Division. This Division was chasing the Japs back to the Chindwin, giving them no rest nor time to regroup. Completely dependent on the Dakotas (the Tiddim Road was "out" for the monsoon), the 5th Division laid another foundation stone for the final Burma victory. It was largely by their efforts that the good weather found the 14th Army on the edge of the Burma plain—ready for this final kill.

The supplying of the 5th Indian Division did not, however, place undue strain on Troop-Carrier Command, and its staff, during the monsoon, was able to study the hard-won lesson of Imphal. A large number of problems to do with the air supply companies had to be faced. These companies handled, from April 18th to June 30th inclusive, 18,000 British tons of supplies for Imphal alone, and the experience they gained in handling this called for some revision of the system. For instance, it had been found that the military stock-holding method of keeping the supplies of any particular commodity at one airfield only could not work, as most Dakota loads had to be "mixed" and this old method involved the flying of aircraft from airfield to airfield to collect the ingredients of a varied load. Mixed depots, therefore, had to become an order of the day. The movements of the Dakotas also had to be planned so as to get the maximum and most economical use of over-taxed resources. For instance, an aircraft based near Silchar might open the day by dropping supplies in Arakan. On its return journey northwards it might land on the Arakan coast to pick up a load for delivery to Imphal, and then complete a further two or three sorties between Imphal, and perhaps to other airfields before returning to base.

A lot of this fully needed sorting-out in the planning of future operations, and the difficulties of the air supply companies which arose from their buffer position between two services had to be realised and put right.

*(To be continued next week.)*

# The Havana Meeting

### *World Organisation of Air Transport Operators*

THE international conference of air operators in Havana marks the beginning of a new chapter in the co-operation of those engaged in air transport. The progress of this conference has been previously reported in *Flight* but, with the return of the British delegation it is now possible to add some more details to the picture.

Major J. B. McCrindle, deputy director general, B.O.A.C., who is the acting chairman of the Executive Committee and whose initiative and efforts during last winter's Chicago conference are in no small measure responsible for bringing the operators together, told *Flight* that the result of the Havana meeting is viewed with general satisfaction.

As previously reported, the conference established an international organisation of air transport operators, I.A.T.A., replacing any previous associations formed on these lines. While regional independent organisations such as that of the British Commonwealth or the A.T.A. of America, will continue to exist and deal with their own problems, it is for the first time that American operators in any numerical strength have joined their European colleagues. Not only in this respect is the framework of the new organisation wider than its pre-war predecessor; for while the pre-war I.A.T.A. was limited to international air traffic operators, the new set-up embraces domestic operators as well. Thus, for the first time the latter will have an opportunity of studying their mutual problems and airing their views on an international platform. For this purpose membership of the I.A.T.A. is divided into active members (operators of scheduled international services) and associated members (domestic operators).

The latter have neither voting rights nor representation on the Executive but are eligible to sit on the different committees and participate in assembly meetings except those reserved for exclusive problems of international operators.

The following operators are listed as active members:—

A.B. Aero Transport (A.B.A.); Aer Lingus Teoranta (Irish Air Lines); American Export Airlines, Inc.; American Air Lines, Inc.; British Overseas Airways Corporation; British West Indian Airways; Braniff Airways, Inc.; Ceskoslovenska Letecka Spolecnost; Ceskoslovenska Statni Aerolinie; China National Aviation Corporation; Cia. Mexicana de Aviacion, S.A.; Colonial Airlines, Inc.; Compania Aerea de Transportes Iberia; Det Danske Luftfartselskab; Det Norske Luftfartselskap (D.N.L.); Empresa de Viacao Aerea Rio Grandense, S.A.; Expreso Aereo Interamericano, S.A.; Indian National Airways; K.L.M. Royal Dutch Airlines; K.N.I.L.M. Royal Netherlands Indies Airways; Norges Luftfartstyre (Royal Norwegian Air Transport); North East Airlines, Incorporated; North West Airlines, Inc.; Pan-American Airways, Inc.; Pan American-Grace Airways, Inc.; Panair do Brazil, S.A.; Polish Airlines "L.O.T."; Qantas Empire Airways; Reseau des Lignes Airiennes Francaises (Air France); Servicos Aereos Cruzeiro do Sul; SABENA of Belgium; SWISSAIR; SILA, Swedish Inter-Continental Airlines; TACA, S.A.; Tasman Empire Airways; Trans-Canada Airlines; Transcontinental and Western Air, Inc.; Transportes Aereos Centro-Americanos; United Airlines; Western Airlines; Wrightways.

While the strict demarcation between the rights of active and associate members seems somewhat harsh, most commendable is the rule governing the distribution of voting, giving each active member one vote. This is a practical display of the willingness of the big concerns to co-operate with their colleagues without trying to dominate the organisation.

To maintain a closer contact between operators, regional centres are to be established in each continent.

An executive committee of 13 members is in charge of the affairs of the organisation. The present members are:—

Major J. R. McCrindle, B.O.A.C. (Acting Chairman); M. Rene Briend, Air France; Mr. A. F. T. Cambridge, Indian National Airways; Mr. John C. Cooper, Vice-President, Pan American Airways; Mr. J. B. Ribeiro Dantas, Empresa de Viacao Aerea Rio Grandense, S.A.; Mr. W. Hudson Fysh, Managing Director, Qantas Empire Airways, Ltd.; Mr. Per A. Norlin, A.B. Aerotransport; Mr. A. Plesman, K.L.M.; Mr. John E. Slater, American Export Airlines.

It is expected to fill the four vacant seats on the Executive at the next general meeting in October in Montreal.

The headquarters of the I.A.T.A. are at present in Montreal to coincide with the seat of the governmental Interim Organisation set up at Chicago. Committees set up to study the most pressing problems and to assist in formulating internationally accepted standards comprise the traffic advisory, the legal, the finance, the technical and the postal committee.

# VICKERS VIKING

## *Review of Latest Post-war Civil Aircraft : Excellent Pay-load and Performance for Low Operating Costs*

By C. B. BAILEY-WATSON

IN announcing their new post-war civil passenger aircraft Vickers-Armstrongs, Ltd., are heralding their intention of furthering their excellent reputation in the commercial aviation field—a reputation which the older readers of *Flight* will remember was propagated with the Vickers Victoria. The magnificent work the company have done during the war years provides a first-class precedent for their work in the future.

Furthermore, in deciding to concentrate on the "medium" aircraft field, Vickers-Armstrongs are showing a sense of realism. This is stated advisedly, as there can be little doubt that, whilst the construction of mammoth air liners sounds important and adds lustre to the constructor's name, the number of mammoths required will be very small, whereas by supplying aircraft in the medium class a larger number of potential buyers is being catered for, so providing a reasonably constant flow of production with its financial stability and harmonious labour situation.

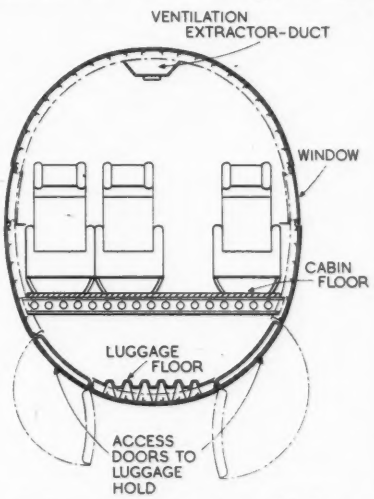
The Viking V.C.1 (V.C. signifies Vickers Commercial) is an aircraft specifically designed for ease of production, which factor has been aided by the employment of "standard" components wherever possible, the only major item of the aircraft which is wholly new being the fuselage, and this is a stressed-skin structure, whereas the wings and tail unit are fabric-covered.

On the whole the Viking is a completely orthodox aircraft; certainly this can be said of its appearance, which conforms to the present standard for civil passenger machines in having an almost parallel length of fuselage tapered sharply at nose and tail.

### New Design Features

Structurally the machine is also conventional, with the exception of one or two points which maintain the Vickers precedent of introducing some new design concept in every new type they build. In the Viking the tradition is upheld by the introduction of a revolutionary form of wing/fuselage attachment and by the employment of a luggage floor in the fuselage which acts as a massive "longeron-keel."

Geodetic-type wings are used, and the wing span is 89ft. 3in.

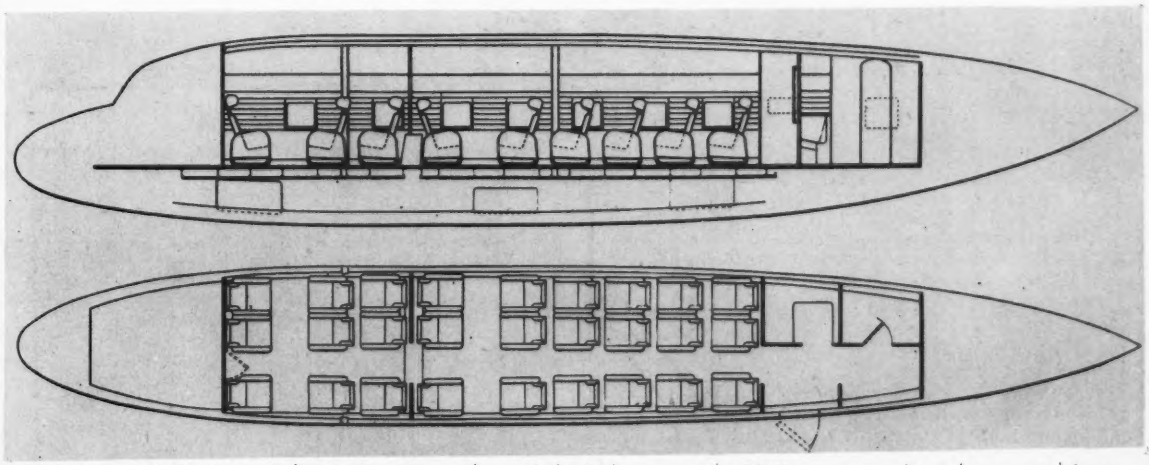



**Cross section of fuselage, showing luggage hold and passenger cabin. The larger luggage door is the normal size, that on the left being beneath the wing.**

### Wing/Fuselage Attachment

Wing-to-fuselage attachment is unique in that it is flexible; the main spar (the wing is of the monospar type) passes through the fuselage without attachment of any kind, being free to "float" vertically, although fore-and-aft movement is restrained. Attachment proper is by link arms at the leading- and trailing-edge sub-spars, the two link arms at each sub-spar end being pivoted on pins retained in Silentbloc rubber/metal bushes in the fuselage frames at the respective stations. To relieve the link arms and main spar from bending loads, a drag beam is secured to the fuselage on each side and carries at its after end a spigot which engages in a sliding block attached to the wing-root rib. This unconventional method of wedding wings and fuselage should provide the passengers with a very pleasant ride, for engine and airflow vibrations of the wing structure will be virtually isolated from the fuselage. Relative movement between fuselage and wings is to be measured only in terms of hundredths of an inch; nevertheless, the flexible mounting is deemed to be quite capable of eliminating almost entirely the transmission of vibration.

Whilst on the subject of wings, it may be stated that basic geodetic wings are employed, and are fitted with ailerons of the full Frise type having mass balancing in their leading edge tubes and conventional trim tabs. A further departure from geodetic practice is that the inboard wing panels, i.e., inboard of the nacelles, are metal-skinned, although the outboard panels are fabric-covered.



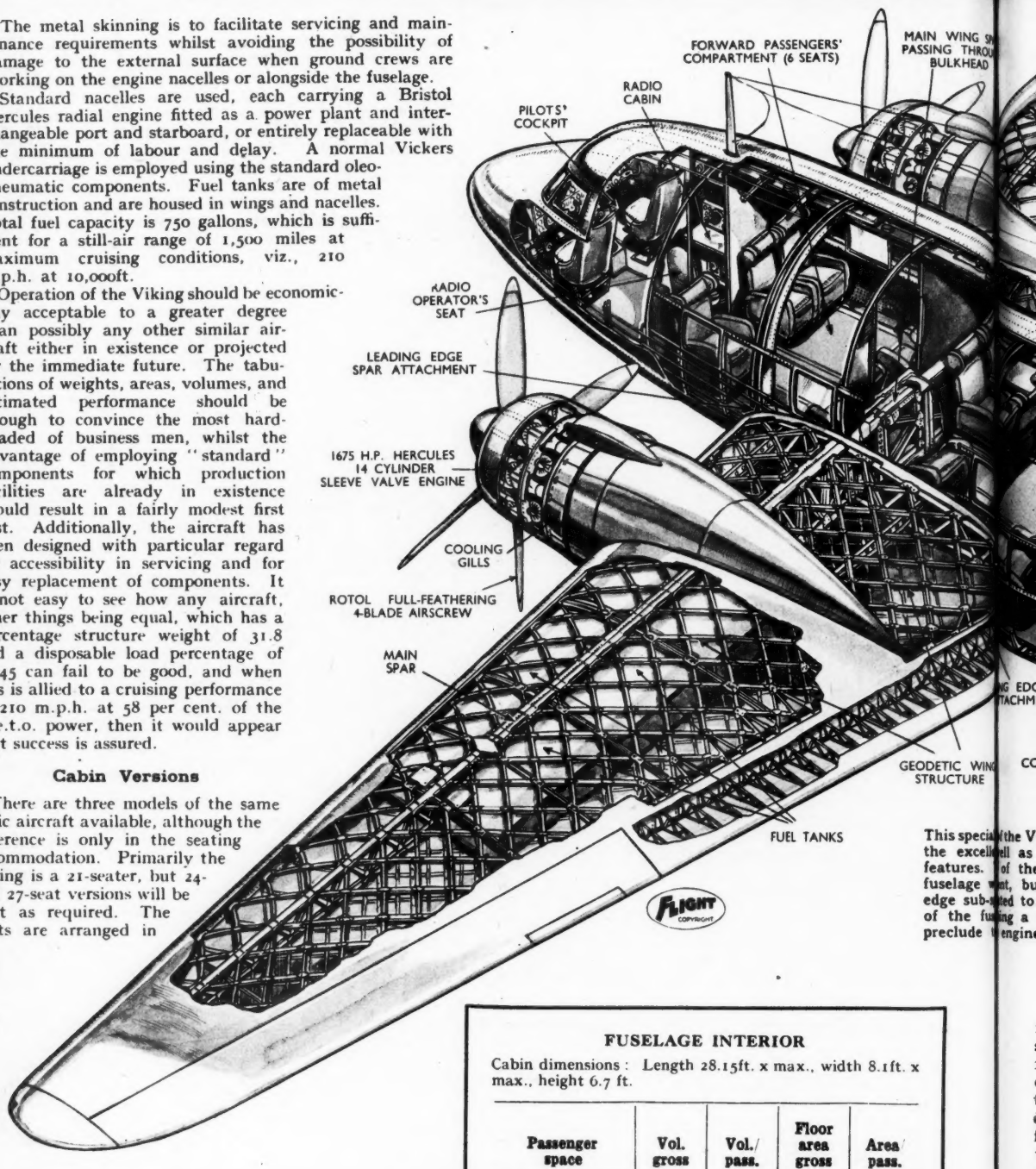
**This accommodation layout is for the 27-seater version and should be compared with the 21-seater shown in our special cut-away drawing. The above layout necessitates moving the front bulkhead forward and so restricts the available control cabin space. Three extra seats are incorporated in each of the passenger compartments.**

# VICKERS VIKING (V.

The metal skinning is to facilitate servicing and maintenance requirements whilst avoiding the possibility of damage to the external surface when ground crews are working on the engine nacelles or alongside the fuselage.

Standard nacelles are used, each carrying a Bristol Hercules radial engine fitted as a power plant and interchangeable port and starboard, or entirely replaceable with the minimum of labour and delay. A normal Vickers undercarriage is employed using the standard oleo-pneumatic components. Fuel tanks are of metal construction and are housed in wings and nacelles. Total fuel capacity is 750 gallons, which is sufficient for a still-air range of 1,500 miles at maximum cruising conditions, viz., 210 m.p.h. at 10,000ft.

Operation of the Viking should be economically acceptable to a greater degree than possibly any other similar aircraft either in existence or projected for the immediate future. The tabulations of weights, areas, volumes, and estimated performance should be enough to convince the most hard-headed of business men, whilst the advantage of employing "standard" components for which production facilities are already in existence should result in a fairly modest first cost. Additionally, the aircraft has been designed with particular regard for accessibility in servicing and for easy replacement of components. It is not easy to see how any aircraft, other things being equal, which has a percentage structure weight of 31.8 and a disposable load percentage of 34.45 can fail to be good, and when this is allied to a cruising performance of 210 m.p.h. at 58 per cent. of the m.e.t.o. power, then it would appear that success is assured.




### Cabin Versions

There are three models of the same basic aircraft available, although the difference is only in the seating accommodation. Primarily the Viking is a 21-seater, but 24- and 27-seat versions will be built as required. The seats are arranged in rows of three, two to starboard and one to port, with an aisle between, and are disposed in two cabins which are divided at the wing-spar station. Owing to the generous headroom throughout the cabin (6ft. 5in. up to 6ft. 8in.) the fact that the wing spar projects above the cabin floor is not inconvenient. The partition dividing the front and main cabins is mounted above the spar casing and has an opening (but no door) at the aisle. Steps are fitted one each side of the spar casing, and one can pass back and forth between front and rear cabins with no inconvenience whatever.

Structurally, apart from the luggage floor, the fuselage

**FUSELAGE INTERIOR**

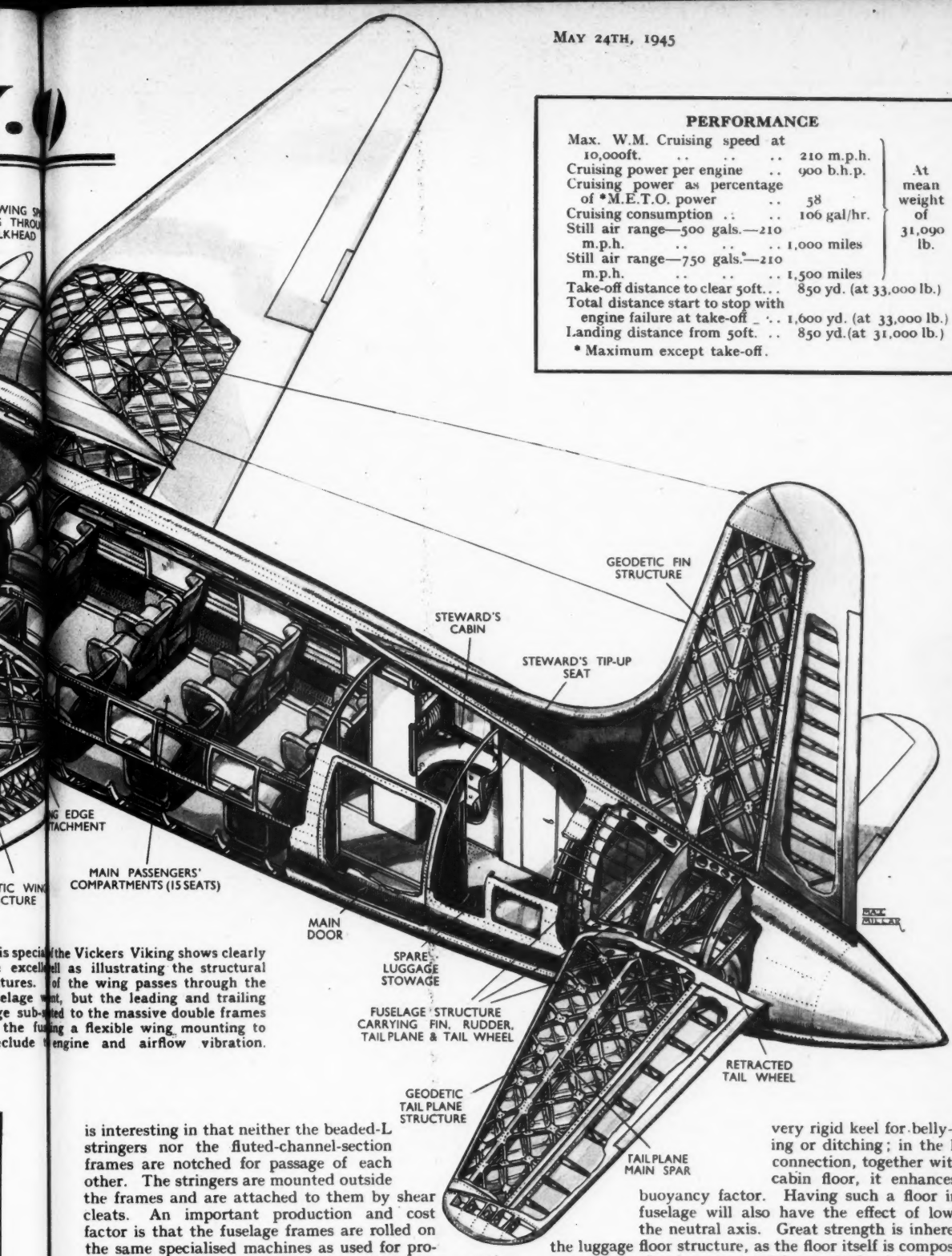
Cabin dimensions: Length 28.15ft. x max., width 8.1ft. x max., height 6.7 ft.

| Passenger space | Vol. gross | Vol./ pass. | Floor area gross | Area/ pass. |
|---|---|---|---|---|
| | Cu. ft. | Cu. ft. | Sq. ft. | Sq. ft. |
| Cabin .. .. | 1,433 | 68.5 | 216 | 10.25 |
| Cloaks .. .. | 22 | — | — | — |
| Pantry .. .. | 80 | — | 13 | — |
| Toilet room .. | 120 | — | 18 | — |
| **Service Space** | | | | |
| Luggage .. | 300 | — | — | — |
| Freight and mail | | | | |
| Crew (Flying—2) | 300 | 150 | 70 | 35 |
| Total .. | 2,255 | | | |

**PERFORMANCE**

| | | |
|---|---|---|
| Max. W.M. Cruising speed at 10,000ft. | 210 m.p.h. | At mean weight of 31,090 lb. |
| Cruising power per engine | 900 b.h.p. | |
| Cruising power as percentage of *M.E.T.O. power | 58 | |
| Cruising consumption | 106 gal/hr. | |
| Still air range—500 gals.—210 m.p.h. | 1,000 miles | |
| Still air range—750 gals.—210 m.p.h. | 1,500 miles | |
| Take-off distance to clear 50ft. | 850 yd. (at 33,000 lb.) | |
| Total distance start to stop with engine failure at take-off | 1,600 yd. (at 33,000 lb.) | |
| Landing distance from 50ft. | 850 yd. (at 31,000 lb.) | |

* Maximum except take-off.



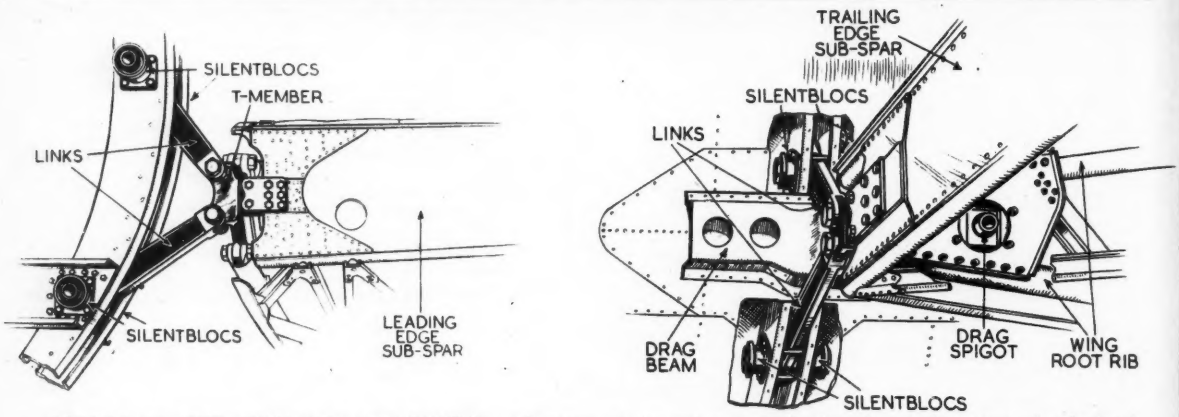

...the Vickers Viking shows clearly ...ell as illustrating the structural ...of the wing passes through the ...t, but the leading and trailing ...ted to the massive double frames ...a flexible wing mounting to ...engine and airflow vibration.

is interesting in that neither the beaded-L stringers nor the fluted-channel-section frames are notched for passage of each other. The stringers are mounted outside the frames and are attached to them by shear cleats. An important production and cost factor is that the fuselage frames are rolled on the same specialised machines as used for producing the geodetic members for the Wellington and Warwick. The metal skin is riveted to the stringers, and plates are laid with a lap joint at horizontal edges, but at vertical meeting edges a butt joint to an internal strap is employed. Wherever openings occur in the fuselage, L-section plates are riveted to the web of the frames as a substitute for not taking the frames out to the skin.

The luggage floor is a very clever piece of work indeed, for not only does it serve the utilitarian purpose of forming a 300 cu. ft. luggage hold beneath the cabin but it is also an extremely strong longitudinal and lateral tie for the fuselage structure, and, as such, facilitates the handling of compressive strains. Additionaily, the floor provides a very rigid keel for belly-landing or ditching; in the latter connection, together with the cabin floor, it enhances the buoyancy factor. Having such a floor in the fuselage will also have the effect of lowering the neutral axis. Great strength is inherent in the luggage floor structure, as the floor itself is composed of heavy sheet deeply corrugated fore and aft with, from each corrugation, lipped plates secured underneath to the fuselage frames. Outboard edges of the floor are attached to the fuselage stringers by shear plates, and lashing rails are provided at frequent intervals across the corrugations. High-density unit loads can be carried on the luggage floor, and this should prove a boon for an aircraft operating as a passenger/freighter in the less well-developed regions of the world. External doors, 44in. long × 23in. effective height, give access direct from the ground to the luggage hold on each side.

The floor of the cabin is of five-ply wood, supported on light channel beams spanning the fuselage and attached to

# VICKERS VIKING (V.C. 1)

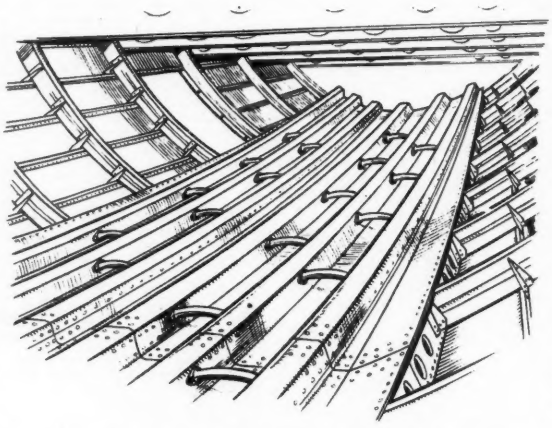



**DETAILS OF WING-FUSELAGE ATTACHMENT:** Mounting of the sub-spars to fuselage frames by means of articulated links carried in Silentbloc bushes is shown. Link arms are pin-jointed to a forged T-member secured to the sub-spar end and also to the wing-root rib. Starboard wing rear attachment is shown at right and port wing front attachment at left.

the frames with sandwich plates. This leaves an absolutely unobstructed space below in the hold.

Provision is made for an operational crew of three, i.e., chief pilot, second pilot, and radio operator. A steward or stewardess has a pantry to starboard aft. Layout of the control cabin is good, having been settled by consultation with the potential operators, but, as in other civil passenger aircraft, it favours the chief pilot. One would not cavil at this if one knew that the captain did most of the flying, but although admitting that the captain carries the responsibility, so far as the actual flying goes, it is usually the second pilot who does most of the work.

One thing that is very appealing about the "office," and which is new on British aircraft, is that the control column is a nearly horizontal push-pull shaft projecting through the facia board. This makes for a clear floor and less obstruction of instruments, and the writer feels that it could well be more widely adopted. Aileron control is afforded by upswept horns, which form a type of "spectacle" wheel without the top cross members, and each control column terminates at its front end at a small gear box mounted at the head of a vertical tube carried on a cross tube. This arrangement is a form of bell crank, and a drop arm off the cross tube is pivoted to the elevator control transmission. For aileron movement the gear box transmits rotation of the control column through a shaft inside the vertical tube to a bell-crank assembly at the lower end, each bell crank being connected by a "track" rod to ensure sympathetic motion for dual control. Transmission for all control surfaces is by push-pull rods carried in Tufnol guides with the usual three ball-bearings wherever a change of direction occurs.



**Lashing rails are provided at frequent intervals in the luggage floor, and the way in which the floor edges are connected to the fuselage stringers and frames by shear plates can be seen**

A point which, perhaps, will affect some pilots less than others is that, owing to the fairly sharp coning of the nose, the axes of the control columns are not parallel to the fuselage centre line; the neutral plane of the rudder pedals is also not perpendicular to the fuselage axis. Thus, each pilot is facing slightly off-centre relative to the line of flight but, as stated, this is a point with which some will be more concerned than others.

Visibility for each pilot is excellent over a really wide field, but the upward zone of view is restricted, as in many civil aircraft, which, in my opinion, is to be regretted. No one, least of all a pilot, likes to have the sun in his eyes, but this could be prevented by overhead sun blinds; in any case, many flights would be northerly. I firmly believe that the best possible *field* of view should be accorded the pilot, if necessary in spite of himself.

As stated, the captain is favoured by the layout arrangements, the control pedestal being off-set from the centre line to his advantage, although the second dickey can handle everything without too much stretching. Curiously enough, the undercarriage control is on the left of the throttles, etc., whilst the flap control is to the right; it would thus appear that the captain will raise the wheels himself instead of, as is more usual, delegating this duty to his subordinate.

Instrument layout appears curious after military machines for the standard blind-flying panel is not employed; instead each pilot has his own b.f. instruments, although their arrangement is different on the respective panels. The second pilot is presumably to act as navigator—at least, in so far as navigation in the accepted sense is required—for he has the variation-setting corrector under his control, whilst the D.R. compass is on the captain's panel. The captain is also favoured by the clock position, although it would appear that he needs it less than his co-pilot—each can see the clock, of course, but the second pilot will have quite a lot of parallax to contend with. It would appear that the operators who will use the Viking have their system of pilot duties cut and dried, but as a pilot I think I should not be very happy about it.

Pilots' seats are fairly comfortable but not of the same comfort standard as used on our heavy bombers. The seats are rather short-backed and are not fitted with head rests so one hopes that most of the pilots are not too tall; adjustment is provided, however, both fore and aft and vertically, and as the rudder pedals are also adjustable for leg reach, a compromise adjustment for optimum comfort should be easy.

The radio operator sits athwartships to starboard, behind the second pilot, and if an operational crew of two only is desired, the second pilot should be able to double as radio operator without too much difficulty. This arrangement

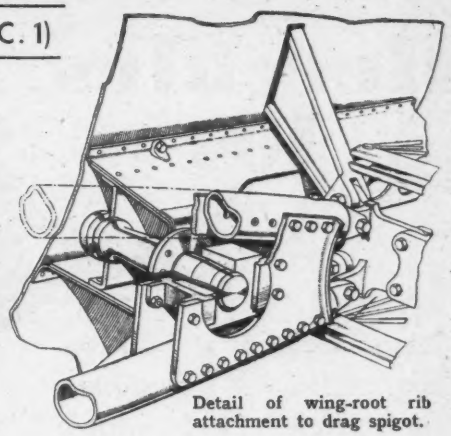
# VICKERS VIKING (V.C.1)

**RANGE TABLE**

| Range miles | Speed m.p.h. | Altitude feet | Power b.h.p. | Fuel Imp. gals. | A.M.P.G. | Pay load lb. | All-up weight lb. |
|---|---|---|---|---|---|---|---|
| 1,000 | 210 | 10,000 | 2×900 | 500 | 2.0 | 6,955 | 33,000 |
| 1,500 | 210 | 10,000 | 2×900 | 750 | 2.0 | 5,085 | 33,000 |
| 1,250 | 160 | 10,000 | 2×560 | 500 | 2.5 | 6,955 | 33,000 |
| 1,875 | 160 | 10,000 | 2×560 | 750 | 2.5 | 5,085 | 33,000 |

**FLIGHT CONDITIONS**

| | B.H.P. | R.P.M. | Boost | Altitude |
|---|---|---|---|---|
| Take-off at sea level | 1,675 | 2,800 | +7 | — |
| Maximum climb (M.E.T.O.) | 1,550 | 2,400 | +6 | 4,750 |
| Max. W.M. Cruising | 1,280 | 2,400 | +3 | 8,500 |
| Recommended W.M. Cruising | 900 | 2,000 | 0 | 10,000 |



Detail of wing-root rib attachment to drag spigot.

emphasises the standard of flight operation which can be expected in the future. In the case of this particular aircraft, flights are likely to be of not more than 600 to 700 miles in single hops—this corresponding to a still-air range of 1,000 miles, which allows a higher pay load than the maximum s.a. range of 1,500 miles.

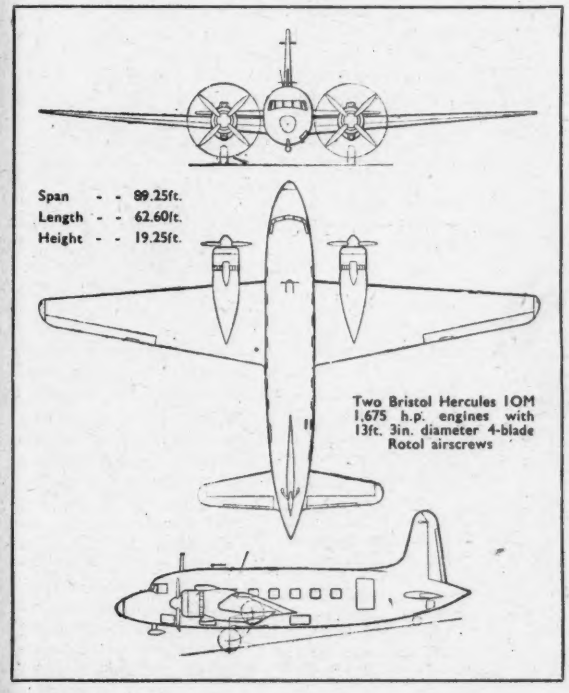
Furnishing of the cabin is carried out in a pale fawn woollen fabric with blue leather piping, which covers roof and walls down to the base line of the windows. Between the windows the cloth is ribbed horizontally and forms an effective break to the uniformity. A dado of heather-brown woven pattern cloth is fitted beneath the windows, and a dark carpet will cover the floor. The whole of the fuselage wall and roof surface in the cabin is insulated for sound absorption with a covering of kapok quilting. Seats are upholstered in a similar fabric to the wall covering and the edges are piped with sky blue.

Windows are quite generous in area and are pitched one at each seat for the 21-seat version. They are 20in. long by 18in. high and are formed by two layers of Perspex with an hermetically sealed space of dry air between. Immediately over each window is a unit panel containing a reading light, steward call-button and adjustable punka louvre for individual cool-air supply.

Cabin atmosphere is automatically controlled for temperature and for ventilation. Vitiated air is extracted through a central roof duct—in which the normal cabin lighting is arranged—and is vented externally. Fresh air supply is entrained through ram heads in the inboard wing leading edges and delivered into a mixing chamber. In each nacelle exhaust gases supply a heat exchanger which feeds warm air to the mixing chamber. Throttles in the cold and warm air ducts are controlled by a thermostat to regulate the proportion of hot and cold air supplied, and as the control is differential, any degree between all-hot or all-cold air can be delivered to the ducts which run beneath the cabin floor. Two mushroom vents at each seat station diffuse the air supplied to the cabin.

At the after end of the cabin the steward's or stewardess's pantry is arranged on the starboard side. So far this is fitted only with shelves and a comfortable folding seat, as the actual equipment to be included has yet to be decided by the operators. To port, opposite the pantry, is the main entrance door, which is of ample width and sufficiently high to allow a six-foot man to pass with only a bending of the head. Aft of the pantry is the toilet room furnished with an Elsan flushing closet and a wash basin.

Generally speaking, the new Vickers Viking is an aircraft of which we are likely to see a great deal on the Continental air routes in the coming years of peace. Certainly it is a good aircraft and one that would appear to be admirably suitable for its duties, and although I have mentioned one or two points that seem worthy of adverse criticism, they are small ones and likely to be remedied. In all truth one can say that the novel features of the flexible wing mounting and the luggage floor already place the aircraft in a class of its own without reference to its likely success in operation.

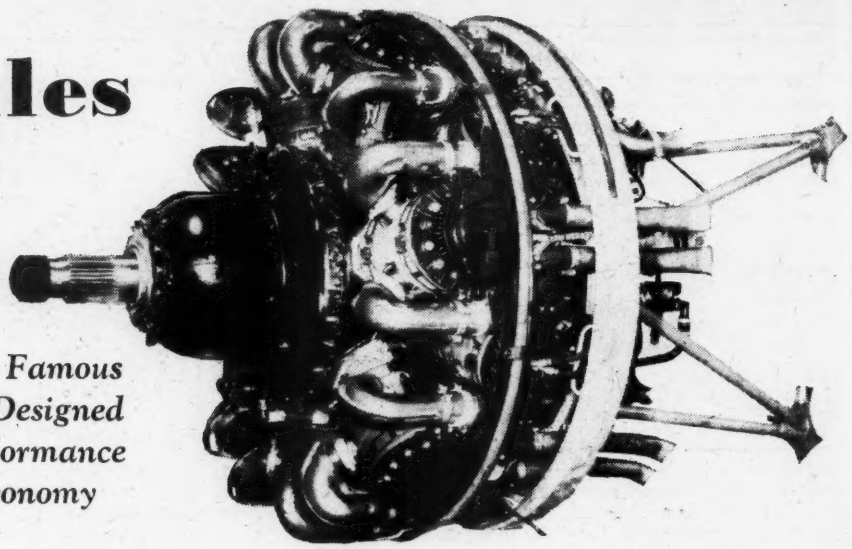

Span - - 89.25ft.
Length - - 62.60ft.
Height - - 19.25ft.
Two Bristol Hercules 10M 1,675 h.p. engines with 13ft. 3in. diameter 4-blade Rotol airscrews

**LOADINGS**

| | |
|---|---|
| All up weight | 33,000 lb. |
| Wing area | 882 sq. ft. |
| Aspect ratio | 9 |
| Standard mean chord | 9.88 ft. |
| Wing loading | 37.4 lb./sq. ft. |
| T.O. Power loading | 9.85 lb./b.h.p. |

| Weights | Totals | Per cent. of All-up weight |
|---|---|---|
| Structure weight | 10,480 | 31.8 |
| Power units and tanks | 7,345 | 22.2 |
| Operating equipment | 1,560 | 4.75 |
| Passenger equipment | 2,240 | 6.8 |
| Empty weight | 21,625 lb. | 65.55 |

# Hercules 10M



## *New Model of a Famous Bristol Engine : Designed for High Performance with Great Economy*

THE fourteen-cylinder, sleeve-valve Bristol Hercules is already a world-famous engine with an excellent record of work well done, and in revealing the details of the HE-10M version the manufacturers are further establishing their flag in the realm of post-war commercial aircraft engines.

First aircraft to be powered with this model of the Hercules is the Vickers Viking, a review of which appears on other pages of this issue. A feature of the combination which is a step in the direction of that desirable goal complete co-operation between aircraft and engine manufacturers, is that the HE-10M is arranged to fit into the existing engine mounting structure as employed for the Hercules XVII models in the Wellington series. The Bristol Company's practice to avoid dismantling the carburettor or injector when installing the engine is to provide the ring of the mounting structure as an integral component of the engine supply, i.e., as an "engine" part as distinct from an aircraft part. This policy, which originated at the Vickers Weybridge factory, has been continued on the new engine by the readiness of the Bristol Company to adopt the standard Wellington mounting ring, which is used on the Vickers Viking, and to arrange for its supply integral with every Hercules 10M engine sent to store or factory.

**DATA**

**Bristol Hercules HE-10M.**

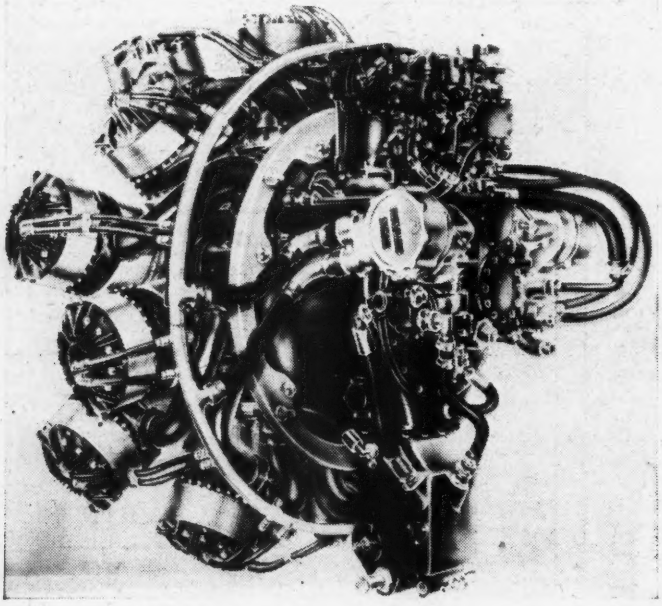
Type: 14-cylinder two-row radial air-cooled sleeve valve engine with single speed "M" ratio supercharger.

| | |
|---|---|
| Bore and Stroke ... ... ... ... ... | 5.75in. × 6.5in. |
| Swept Volume ... ... ... ... ... | 2360 cu. in. (38.7 litres). |
| Dia. over cylinders ... ... ... ... ... | 52in. |
| Airscrew reduction gear ratio ... ... ... | 0.444 engine speed. |
| Airscrew shaft size ... ... ... ... ... | S.B.A.C. Standard No. 6 |
| Airscrew rotation ... ... ... ... ... | L.H. Tractor. |
| Engine Weight (bare) ... .... .... ... | 1870lb. (dry). |

The inherently excellent fuel and oil consumption characteristics of the Hercules, coupled with the employment of a new single-speed supercharger, have contributed largely to the attainment of the present purpose. Not only has weight been reduced by redesign of the impeller drive mechanism, but further weight reduction has been effected by the use of magnesium alloy castings in place of aluminium wherever stress considerations have permitted.

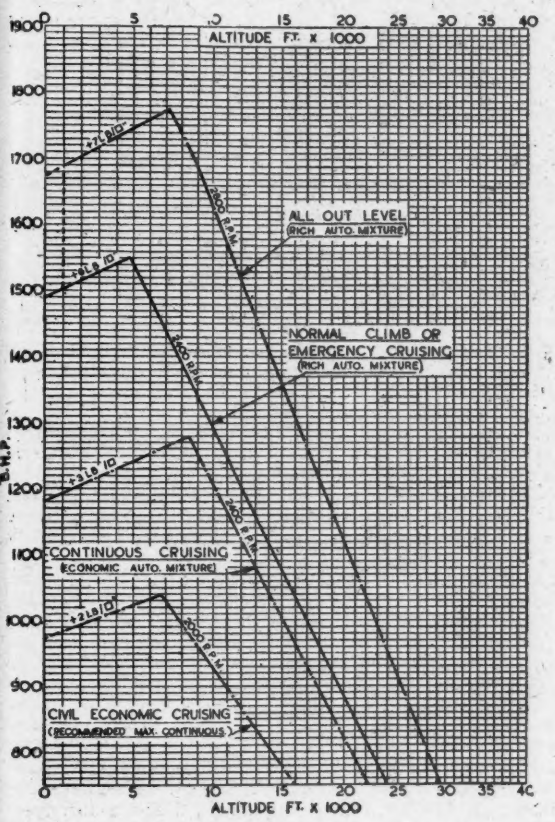
Every advantage has been taken of the progress made during the many years' intensive development of the sleeve-valve engine, as well as the millions of hours of flying experience gained during the war period. The result is an engine embodying all the latest production technique to give the enhanced performance of a high-duty military engine together with the ease of maintenance which has made such engines so deservedly popular with Service personnel.

In this connection mention may be made of the trouble-free fuel and ignition systems and of the fixed-crankpin sleeve-type big-end bearing, all three of which will go a long way toward ensuring considerable operating periods between overhauls. Further, in consideration of the power plant aspect as distinct from the purely engine aspect, the efficiency of the installation is enhanced by virtue of the quickly detachable hinged-type cowling designed to give minimum drag, together with the rear-swept exhaust system

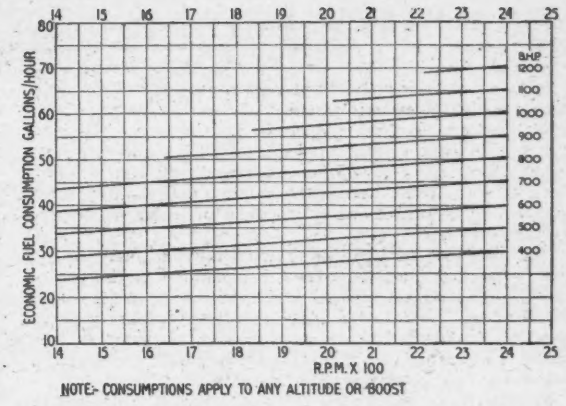


**Three-quarter rear view showing mounting ring, harness, induction pipes and accessories. A front three-quarter view of the engine is shown at the head of the page.**

## HERCULES 10M




Curves of engine conditions for power output at varying altitudes.



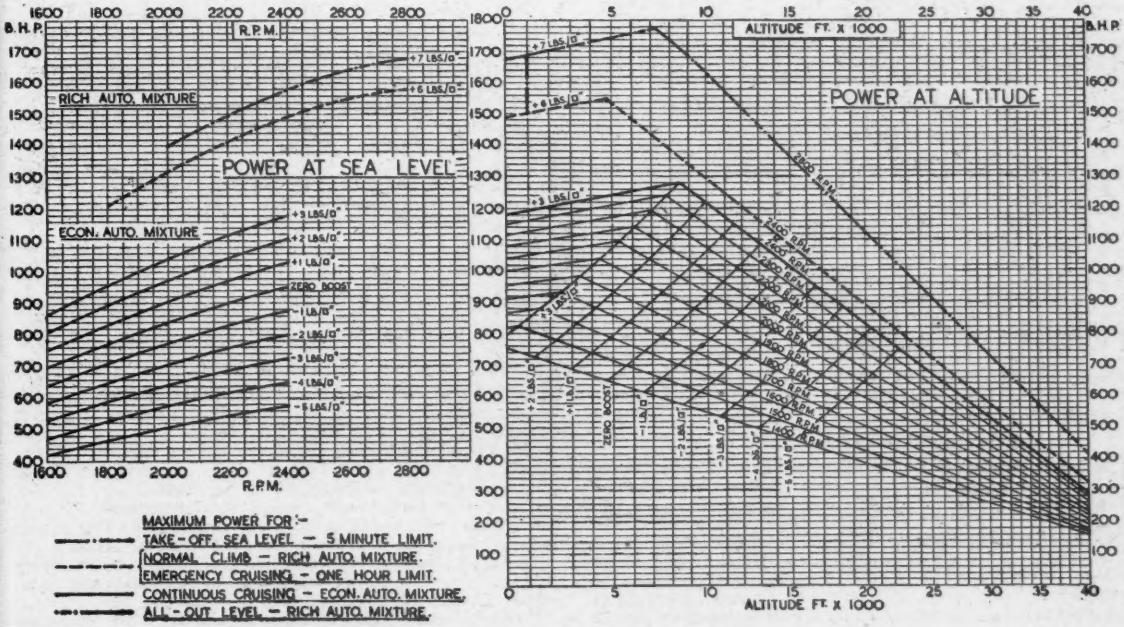

Curves of economic fuel consumption for various powers.

with individual outlet pipes from each cylinder which has proved so successful in the latest bomber applications.

An epicyclic reduction gear employing bevel wheels gives a ratio of 0.444 between crankshaft and airscrew shaft, the three planet wheels being carried on "spoke" stub arms off the airscrew shaft and meshing with, and rotating against, the "sun" wheel (the foremost bevel) which is secured to the reduction gear casing. Input to the planets is through the rearmost bevel, which is carried on the fore end of the crankshaft.

The crankshaft is an interesting component of the three-section built-up type, with the front and rear sections secured to the crankpins of the centre section with maneton joints, a form of construction pioneered by, and unique to, the Bristol Aeroplane Company. Big-end bearings on the Hercules are of the type evolved by the company and used with such great success on the Pegasus and Perseus engines; the bearings consist of white-metalled steel sleeves shrunk on to the crankpins, and superseded the earlier floating type bush some years ago. One of the main advantages of the special bearing is that periods between overhauls are greatly extended.

There are three main crankshaft bearings, housed in the




Performance curves for sea level and altitude powers at varying r.p.m. and boosts.

## HERCULES 10M

crankcase, of which the front and centre are of the self-aligning roller type whilst the rear bearing is of parallel roller pattern. Crank balance weights contain Saloman dynamic vibration absorbers, and an oil jet is arranged to spray oil on the centre main bearing at all times. Two other oil jets are located in the balance weights and throw oil on to the pistons and con-rods of their respective cylinder banks.

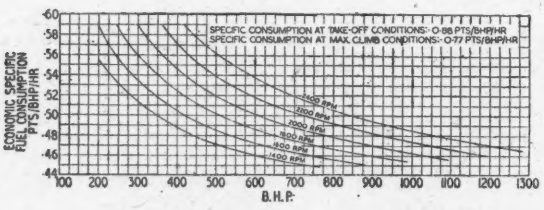
Cylinders are of light alloy with a great many deep, closely pitched fins. Grooves are machined in the top of the barrel to release any oil which may accumulate above the sleeve. The cylinder heads are of two-piece construction, and a flash of tin is deposited on the running surfaces. Pistons are very rigid components with two seal and two scraper rings each.

The drive mechanism for the sleeve valves is located in the front section of the crankcase and is enclosed and supported by the front cover. It comprises seven sets of gears which drive the fourteen sleeves from a common input gear attached to the crankshaft.

Magnesium alloy is featured largely in the construction of the single-speed supercharger, the entry casing and support plates both being of this material. Drive for the impeller is through two duplicate gear trains incorporating a spring drive unit and centrifugal clutch to protect the impeller mechanism from the effects of inertia at sudden changes in engine speed. A Purolator oil filter is built into the supercharger in order to clean the oil supplied to the constant speed unit. The impeller gear ratio is 6.38 : 1, which corresponds to the M gear ratio of two-speed blowers.

Magnesium alloy is also used in the manufacture of the oil sump, which component contains a float-type constant level device. The filter cover is retained by a single stud in order to ensure ease of access. An overflow valve is embodied to prevent sump flooding, and an oil-operated induction pipe drain-valve is also incorporated; this valve ensures that the induction pipes are permitted to drain whilst the engine is stationary.

The fourteen induction pipes feeding the individual cylinders are built-up components with screwed joints ensuring a pressure-tight and leak-proof assembly. Drains are incorporated in the lower pipes, by means of which the removal of any surplus fuel which might otherwise accumulate is facilitated.




**Curves for economic specific fuel consumption at various powers.**

**MAXIMUM OUTPUT AT SPECIFIED CONDITIONS**

| Condition | R.P.M. | B.H.P. | Altitude ft. | Boost lb./sq. in. | Consumptions | | |
|---|---|---|---|---|---|---|---|
| | | | | | Fuel per B.H.P./hr. | Oil pints/hour | |
| | | | | | | average | max. |
| Take-off (5 min. limit) | 2,800 | 1,675 | S. L. | +7 | 0.880 pts. 0.792 lb. | 14 | 28 |
| Normal climb or emergency cruising (rich auto) | 2,400 | 1,550 | 4,750 | +6 | 0.770 pts. 0.693 lb. | 8 | 16 |
| Economic cruising (econ. auto) | 2,400 | 1,280 | 8,500 | +3 | 0.465 pts. 0.418 lb. | 8 | 16 |
| Recommended max. continuous cruising for civil operation (econ. auto.) | 2,000 | 1,040 | 6,750 | +2 | 0.460 pts. 0.414 lb. | 5 | 10 |
| All-out level (5 min. limit) (rich auto.) | 2,800 | 1,775 | 7,250 | +7 | 0.880 pts. 0.792 lb. | 14 | 28 |

On the rear cover are carried the main engine accessories such as magnetos, oil pump, fuel pump and electric starter. Provision is also made for an auxiliary drive to enable a gear box carrying aircraft accessories to be driven. The oil pump is of gear type and comprises a pressure pump and separate larger scavenge pump, the constant-level device in the sump ensuring that the scavenge pump inlet is always submerged.

Standard Bristol practice is followed for the HE-10M ignition system in the employment of Simms 14-cylinder type magnetos and a readily accessible H.T. wire harness. Additionally, the latest development in sparking plugs, the Lodge 954 incorporating sintered alumina insulators, is specified, and this should contribute in large measure to ensuring trouble-free running with a minimum of maintenance.

A Hobson-R.A.E. fuel injector is standard for this engine and is arranged for single-lever throttle and mixture control operation. Such an installation gives the following important advantages over the normal float-chamber type carburettor:—

(i) Gravity and inertia effects are negligible, and the injector places no limitations on aircraft manœuvrability.
(ii) Accurate mixture-ratio control is automatically provided at all combinations of engine speed and load, independent of changes of altitude, airscrew blade pitch or throttle position.
(iii) The pressure atomisation of fuel gives increased economy, flexibility, and smooth running.
(iv) Protection against fuel boiling and vapour lock.

The engine-driven fuel pump used in conjunction with the fuel injector on this engine is the Plessey metering-type F.M.5, which delivers fuel to the regulator unit of the injector at a pressure of 27 lb./sq. in., the fuel and pressure balance pipes connecting pump with injector being supplied with the engine.

## *SWITZERLAND'S FIRST*

THE first Swiss commercial aircraft to leave Switzerland for five years arrived in Lisbon. It brought Dr. Lienart, Director of the Swiss Department of Commercial Expansion, and 17 other Swiss passengers who have come to arrange a Swiss exhibition in Oporto.

## *RESTRICTED FLYING*

THE Air Ministry announces that restrictions on civil flying in the United Kingdom, imposed by the Air Navigation (Restriction in Time of War) Orders, 1939 and 1940, will remain for the present in force for military reasons and in the interests of general safety.

The effect of this is that no civil aircraft shall fly or attempt to fly to, in, or over the United Kingdom, except under the authority and in accordance with the terms and conditions of a permit in writing issued by, or on behalf of, the Secretary of State for Air.

Some relaxations will be made in the conditions governing the issue of these permits to fly.

## *FOUR A WEEK*

FOUR services across the Atlantic every week between England and U.S. will be run until next winter by British Overseas Airways Corporation flying-boats.

The flying-boats, which are now operating on their summer schedule this week, are the largest in the world in commercial service, weighing more than 40 tons fully loaded.

The voyage from Poole, Dorset, to Baltimore, U.S., with one stop at Newfoundland, is 3,724 miles, and by this service Baltimore is brought within about 30 hours of England.

This flying-boat service is in addition to B.O.A.C.'s North Atlantic landplane service which flies daily in both directions between Prestwick, Scotland, and Montreal.

B.O.A.C. aircraft are making on an average more than three Atlantic crossings every day.

# CORRESPONDENCE

*The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.*

## DESIGNERS SHOULD FLY

### *One of the Industry's Major Faults*

AS a member of the aircraft designing fraternity, who are responsible for "dreaming up" so many of the "punk machines," referred to by your correspondent, "Test Pilot" (*Flight*, May 3rd), I heartily endorse his opinion on the very obvious need for more "Men with Wings" in this country's project and design offices.

It is all too common to find pukkah design wallahs who are laying out a new design, groping blindly for something a little different, with the ultimate result of turning a perfectly sound pilot into a nervous, grey-haired wreck through trying to cope with something which was a little too different.

We of the designing fraternity are not trying to wangle a few free flips; we are badly in need of *actual flying experience* if we are to compete successfully with our main competitors in France and the U.S.A.

If there are any real enthusiasts left in Britain after 5.5 years of mortifying Air Ministry specifications, let them go to the "chief" to-day and tell him that we are wise to at least one of the major faults existing within the industry at the present time.

E. W. BRICE-HILL.

## GRADING THE AMATEUR

### *Plea for Fewer Regulations*

I AM horrified to read in *Flight*, May 10th, the article by "Indicator" on "Grading the Amateur."

May I ask what harm has the amateur pilot done him, that he should wish to introduce new regulations, making it much harder and far more expensive for our post-war young men and women, who, one imagines, will be just as intelligent as pre-war, but even more airminded, and—if there are not too many regulations—even more anxious to fly?

On the contrary, let us try to make it simpler. I would suggest that a pupil should be allowed to fly club aircraft without any licence, subject to his *licensed* instructor's permission, an "A" licence only being necessary for flying a privately owned aircraft or one hired from other than his club airfield.

If we are going to keep introducing more regulations, why not an "A" for children to walk in the garden and a "B" licence to walk on the footpath, and a "C" permitting them to cross the road, and after adequate instruction a "D" licence to mount and dismount from a public vehicle?

Although one hopes there will be a large number of civilians wishing to learn flying after the war, one cannot hope for as many pilots as there are now, when flying is not only free but a salaried job.

One imagines that insurance companies will be a sufficient check on ability.

V. L. DICKINSON.

## FLYING-BOAT MOORINGS

### *Successful Single-handed Methods*

WHILST in agreement with the general trend of your remarks in the article on Mr. Gouge's mooring and berthing scheme (*Flight*, May 3rd) concerning the difficulty of mooring-up a seaplane single-handed, particularly as a commercial operation, I don't think the potential private seaplane-owner should take your comments too much to heart.

You say that Mr. Lankester Parker used to taxi up to the buoy, throttle back, jump out on the port float, walk to the bows, and pick up the rubber buoy designed by the late Mr. Eustace Short. That certainly does sound a tricky undertaking either for flat calm or in a strong tide with the wind at right-angles.

When I was preparing for my first attempt to fly the Arctic air route with my Gipsy Moth, *Rouge et Noir*, in 1933, I forget whether it was Capt. Norman Blackburn or Flt. Lt. Woodhead (who instructed me in seaplane flying) who gave me much helpful advice about this very problem of mooring-up single-handed. For obviously one of the greatest perils on this flight would be due to the mooring risk. No rubber buoys were provided in the Faroes, in Iceland, Greenland, Baffinland, or in Labrador, and the well-intentioned but misdirected efforts of the Eskimos might bring about the wrecking of my aircraft in a twinkling. The system I worked out with the help of my advisers consisted of a Grabbit boat-hook stowed alongside the fuselage where it could be reached from the cockpit. From the nose of the starboard float a steel cable, ending in a dog-leash type of fastener, ran through guides up to my cockpit. Thus I could approach my mooring (any buoy which was not too enormous could be used) with the boat-hook already snapped on to the cable from the starboard float, and whilst retaining complete control of the craft as I stood on the rudder in the cockpit, I connected my hook to the buoy immediately it came under the trailing edge of the wing. In practice this system worked extraordinarily well at Kiel, Scapa Flow, Thorshavn and Reykjavik. Thorshavn was the only place where I had difficulty, owing to the very strong current causing me to leave go of the boat-hook prematurely at the first attempt.

In 1934, when I fitted out the Fox Moth seaplane *Robert Bruce*, I used the same mooring-up system with small refinements. For instance, the boat-hook was stowed internally in the fuselage, which meant that care had to be taken not to prod the Grabbit into the revolving airscrew when withdrawing it. The places where this method of single-handed mooring were used were Rochester, Londonderry, Reykjavik, Angmagssalik, Godthaab, Lake Harbour, Povungnituk, East Maine and Ottawa.

With all the variable conditions encountered in weather, topography, and local talent, I was able to have complete confidence in my ability to moor up, and in my humble opinion such confidence is half the battle in the successful operation of small seaplanes when visiting strange places.

In conclusion, I should like to say how welcome is such a scheme as Mr. Gouge's as a practical effort to eliminate the messy business of getting aboard a flying-boat. Personally, I rather enjoy the trip out in a dinghy, especially if the sea is rough, but so far as commercial aviation is concerned such time-wasting pleasures should be denied to the future air traveller. If Mr. Gouge's layout can be made to work at reasonable cost, we may reach a stage where getting in and out of a flying boat is easier than with a landplane.

JOHN GRIERSON.

## DANGERS IN TURNING

### *Wing Loading and Acceleration*

MR. HENDERSON, in *Flight*, May 10th, has put forward some interesting criticisms of Sqn. Ldr. Sipowicz's article on the dangers of turns (*Flight*, April 26th). However, he has, in my opinion, overlooked one or two points.

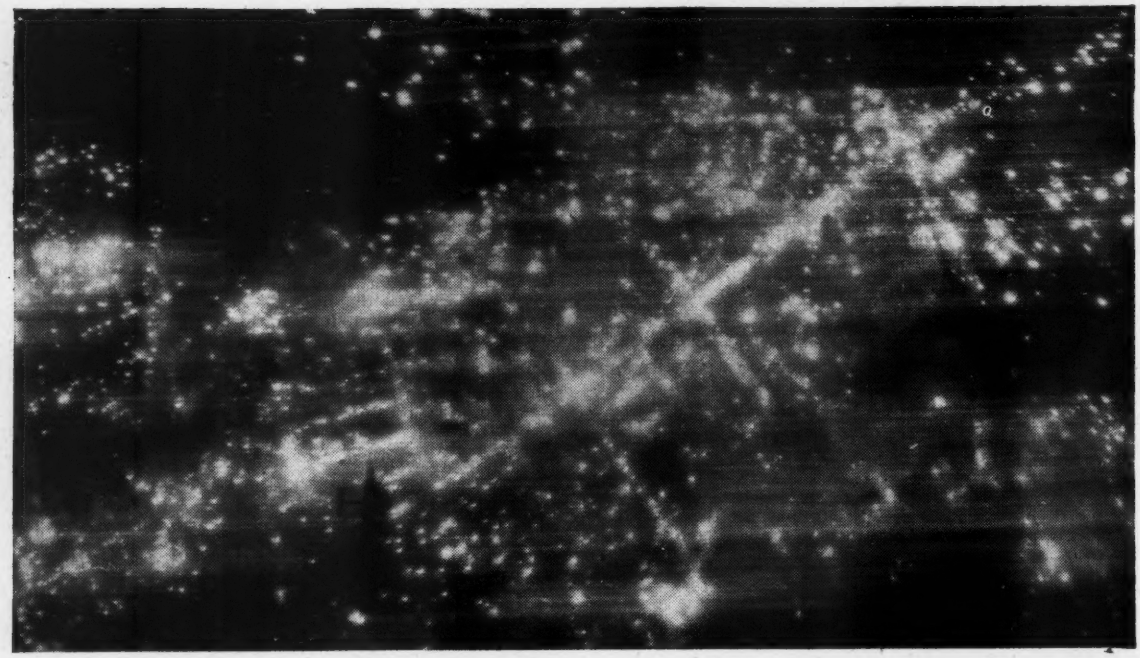
First, he states that the factor governing load increase is "acceleration in the pitching plane." With this statement I agree, but in order to cause "acceleration in the pitching plane" (horizontal, due to the bank of the aircraft) force must be applied. This force could only be supplied by the lift of the wings in a greater or less degree proportional to the bank of the aircraft. By this I hope I have proved that "acceleration in the pitching plane" is governed by the bank of the aircraft.

I now come to two examples, both 180 degrees turns, both rate 3 both at 70 degrees of bank. Any pilot knows that 70 degrees is approaching the limiting angle for any aircraft and that if it is maintained without slip the turn is at least rate 5. However, for the purpose of the example we'll assume that such is not the case. A rate 3 turn means that in one-third of a minute (20 sec.) the aircraft turns 180 degrees.

Now, as the fast aircraft is travelling at 200 m.p.h., it will cover during the course of the turn a distance of 5,820ft. (200 m.p.h. = 291ft./sec.). The second aircraft travelling at 300 m.p.h. would cover 8,800ft. (300 m.p.h. = 440ft./sec.). Finally, when we attempt to fly the 300 m.p.h. aircraft around the 200 m.p.h. arc of turn, says Mr. Henderson, we experience greatly increased loadings. To accomplish this last we would require more bank as the 300 m.p.h. aircraft would cover the 5,820ft. arc in some 13 sec. (i.e., almost a rate 5 turn).

All this, in my opinion, greatly supports Sqn. Ldr. Sipowicz's contention whilst refuting both those of Mr. Henderson, i.e.: (1) That increase of loading depends on "tightness of turn" as we have two turns of varying load and equal "tightness." (2) That increase of loading depends on airspeed as we have two turns of varying airspeed but constant loading.

H. W. JONES.



THE TERROR BY NIGHT: An incendiary raid by R.A.F. Bomber Command on Hanover in October, 1943. The streets are outlined by fires and a Lancaster is silhouetted as it passes over the target.

# Lessons of the Air War

## *Part II—Air Power in Attack*

By MAJOR F. A. de V. ROBERTSON, V.D.

A BOMBER force must be flexible. It must be prepared to support the work of the Royal Navy; it must be ready to lend help to the Army; and it must also carry out independent operations such as striking at enemy war production. This last class of work is commonly called strategic bombing, because it is not connected with any definite battle. But no sharp line separates strategy from tactics, and attacks on war production, it may be argued, are certainly intended to help the other Services by depriving the enemy of armament with which to fight. This was particularly the case when British and American bombers, shortly before the landing in Normandy, concentrated their attacks on the German factories which produced fighters and on the enemy's fighter airfields. These attacks went far to ensure for the Allies a definite supremacy in the air which greatly smoothed the path of the invading armies, and so contributed mightily to the complete collapse of Germany eleven months later.

It is as well to emphasise at this point that, despite the theories of General Douhet and Major Seversky, no attempt was made to win this war by bombing alone. From this it may be deduced with assurance that the Chiefs of Staff of the Allies were convinced that victory in that way was not possible, for they must undoubtedly have considered the possibility.

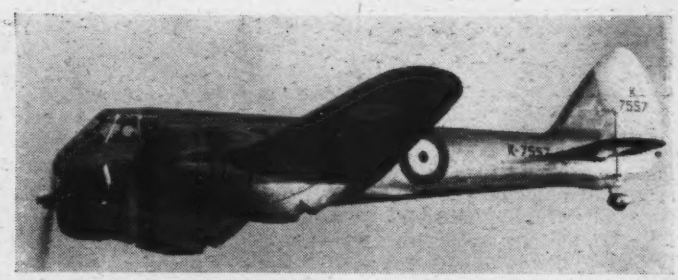
Some time before the war broke out, however, the British authorities realised that it would take a long time to raise a British Army as powerful as that of 1918. In the meantime our Allies (at that time France was the only certain Ally) would need substantial help. The French, though possessed of the second most powerful fleet, had never considered that the blockade which the British Navy would apply to the enemy was sufficient help for them—and in truth a blockade works slowly. So Britain decided that the best help she could give to her Allies, while her Army was being raised, trained and equipped, was to prepare a force of bombers that could strike beyond the battle lines at the sources of the enemy's fighting power.

That policy was not new in 1939, but it had not been publicly proclaimed. Moreover, it was very slow in taking practical shape. For many years the class then called day-

PRE-WAR DAY-BOMBER. The Hawker Hart stepped up performance by over 50 m.p.h.

bombers had been making steady but not rapid progress. The class consisted of single-engined biplanes. The Hawker Hart, first shown to the public at the Olympia Aero Show in 1929, was a big step forward. It was later replaced by the Hind, which had an improved performance. But for years the class of night-bombers could not improve on the slow old Vickers Virginia with its ability to carry a bomb load of only 1,500 lb. British designers are admittedly the best in the world; but during those years they seemed to have gone to sleep. The attempts to find a replacement for the Virginia were almost ludicrous, and are better forgotten.

The first major step forward was not in load or range, but in armament. The power-operated gun turret was designed, but at first it was installed, not in a bomber but in a flying boat. Flying boats certainly need gun turrets, as the Sunderland has shown in many successful combats with German fighters; but so do bombers. However, once the principle had been established, progress was rapid.



BRISTOL'S "BRITAIN FIRST." This was the forerunner of the famous Blenheim, Beaufort, Beaufighter, Bisley and Buckingham series which have done such good work.

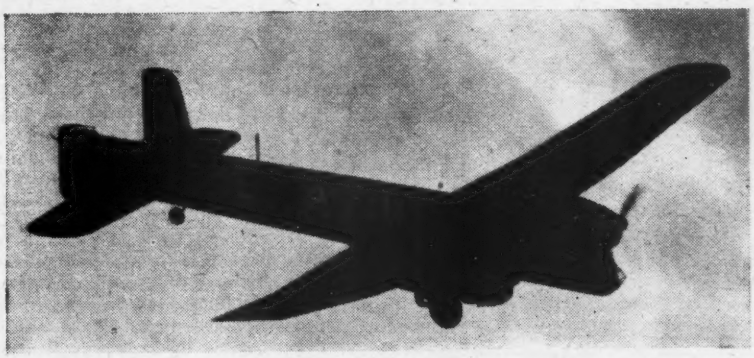
### A Sudden Advance

The change in other respects came rather suddenly. A private order by the late Lord Rothermere to the Bristol Company produced the forerunner of the Blenheim, which was almost a marvel for its time. The Blenheim was a mid-wing monoplane with two Bristol engines, it had a top speed of 285 m.p.h. It had a power-operated turret, but only one machine-gun in it.

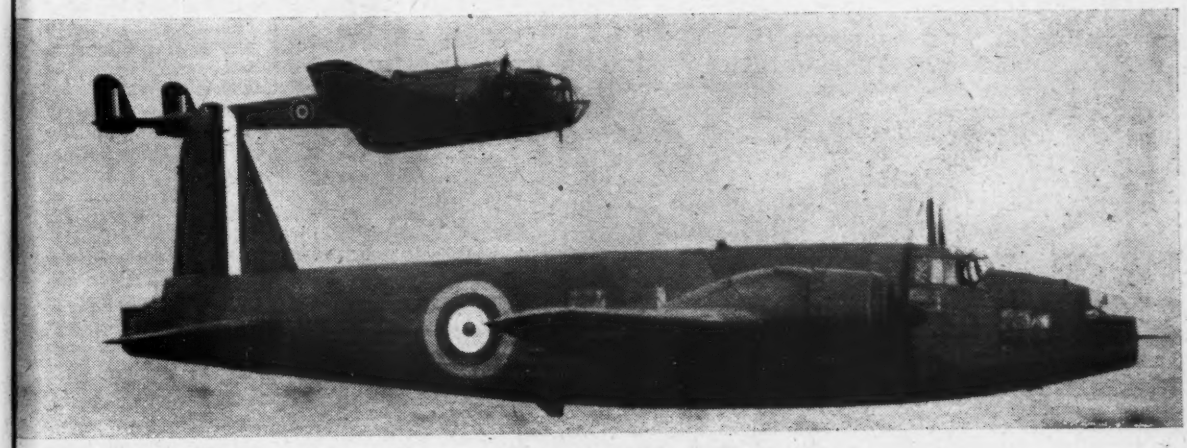
Then, rather suddenly, improvements came thick and fast. Mr. B. N. Walls, one of the Vickers' designers, introduced the geodetic method of construction, which gave great strength for light weight, and so promised long range and a substantial bomb load. The long range was proved when three single-engined Wellesleys established a new non-stop record for the world. But we are more interested in the twin-engined Wellington, which was soon to be acclaimed by the Air Ministry as "the best bomber in the world." About the same time the Armstrong-Whitworth firm produced the twin-engined Whitley, and the Handley-Page firm the Hampden. All these, with the exception of the Hampden, were equipped with power-operated turrets, and possessed a very considerable fire power. The aim of their designers was range, bomb load and armament. Speed was not regarded as a prime consideration. When first produced, these three types of twin-engined bomber were regarded as heavies. They were all in the hands of the R.A.F. when war broke out, but they were still rather novelties. Before long they became trusted friends.

But better things were already on the way. For some considerable time designers had been at work on four-engined bombers, and early in 1941 the Short Stirling and the Handley-Page Halifax were taking part in operations. To them was subsequently added the Avro Lancaster (after experiments with the twin-engined Manchester, which did not give satisfaction), and the Lancaster proved the grandest heavy bomber in the world. Before the war was over it was carrying and dropping bombs weighing ten tons (thanks again to Mr. B. N. Wallis) which had not even been dreamed of when Mr. Roy Chadwick designed the Lancaster. No other aircraft could carry such a load.

During the war it became apparent that what really mattered in a bomber



EARLY HEAVIES: The Armstrong-Whitworth Whitley (left) and the Handley Page Hampden and Vickers Wellington (below) which were Bomber Command's standard heavy aircraft at the outbreak of war.



## LESSONS OF THE AIR WAR

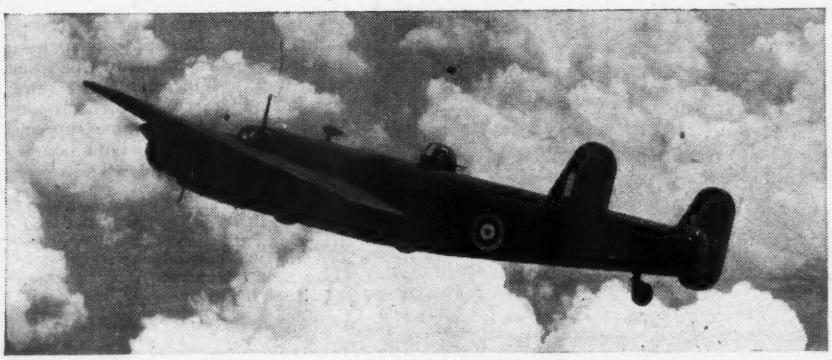
The Short Stirling was the first of our four-engined bombers to go on operations. It is shown here, protected by Hurricanes, making a daylight raid on the Potez aircraft factory at Nealté as early as August, 1941. The Stirling has also done a lot of target towing and supply dropping.

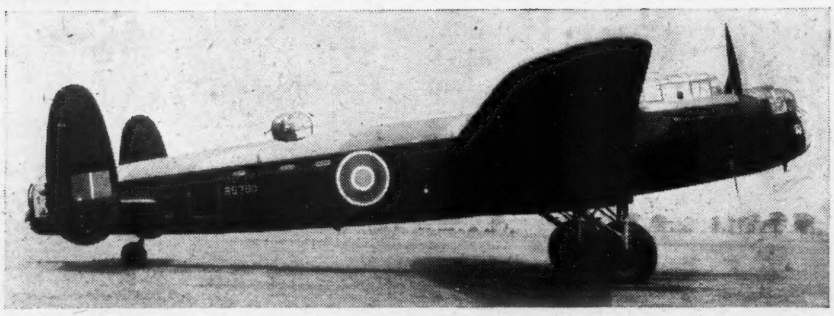
offensive was the weight of explosive dropped. Next in importance, perhaps, was concentration of attack. By very careful and brilliant staff work at the headquarters of Bomber Command, it was found possible to decrease progressively the time in which hundreds of heavy bombers could unload their cargoes onto a given target. These tactics saturated the defences, and made it impossible for the civil defence parties in the doomed cities to get to work until the damage had been done. Often, too, these terrific salvoes overwhelmed the A.A. gunners down below; while defensive fighters had little time to tackle the bombers unless they had previously discovered the objective of the attack and had made early contact with the raiders. This often happened, though there were a number of cases in which clever routing of the raid and feint attacks on other places misled the defence.

Though the big bomb was the great stand-by of Air Chief Marshal Sir Arthur Harris' Command, extensive use was also made of incendiaries. When it was known or suspected that German armament works were widely dispersed through a district, employing bicycle shops, cabinet makers, and so on, it became necessary to blot out the area. In such cases it was often found that fire was the most certain agent to do the work, and many thousands of incendiaries were dropped in a few minutes. It was impossible for the fire brigades to tackle all the conflagrations, and if H.E. bombs were coming down at the same time the brigades ran a grave risk by venturing into the streets.

### U.S. Day Bombing

As the war progressed, it was learnt that where there was much dispersal of armament manufacture throughout industrial districts of a city, there was often an assembly factory, the keypoint of the whole system, standing alone at some distance from the city. Night bombing on the area principle could not make sure of obliterating that factory. It became the usual thing to request the U.S. Army Air Force to fly to that place in daylight, and with the help of its remarkably accurate bomb-sights to destroy that building. Towards the end of the war the R.A.F. was also in possession of an extremely accurate bomb-sight; while with the help of radar instruments it became able to hit individual targets through fog and cloud. In fact, the late Under-Secretary for Air, Commander Brabner (who was lost in an aircraft accident off the Azores), said shortly before his death that night-bombing might soon become more accurate than day-bombing. He did not go into details or give the grounds for this opinion.



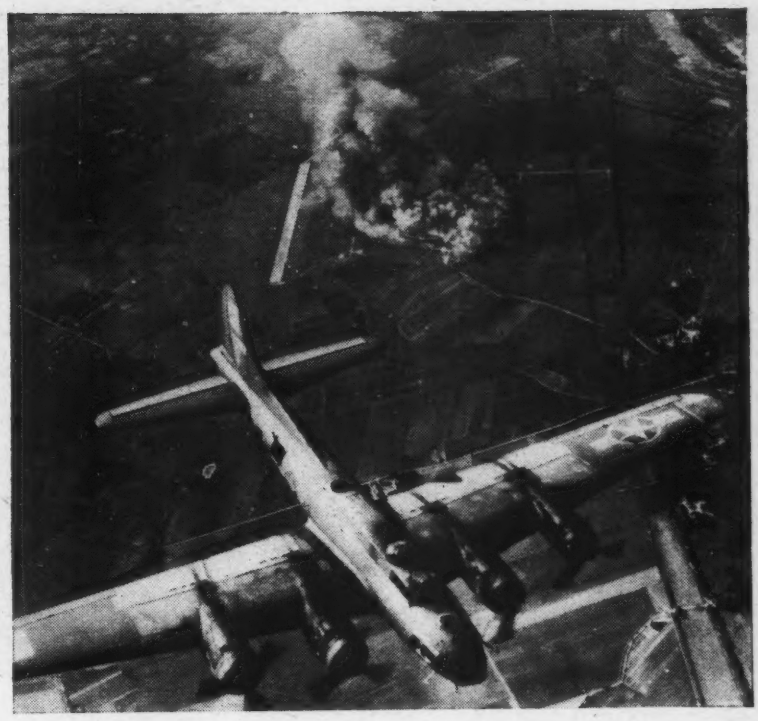


TWO FAMOUS BOMBERS: The Handley-Page Halifax (top) has done great work in glider towing and supply dropping in addition to its ordinary role of night bomber. The Avro Lancaster has been used for both day and night bombing and has carried the heaviest bombs and the heaviest weight of bombs in the war.

The United States Army Air Forces were gradually built up in the United Kingdom until they exceeded the numbers at the disposal of Bomber Command. Their Flying Fortresses and Liberators had been designed for day-bombing, and their aircrews had been trained in that form of operation. The machines had ample tankage, which gave them a good range, but the bomb bays were not designed to accommodate large bombs. The American case was that the

accuracy of their bomb-sights made heavy bomb loads unnecessary, for a moderately powerful bomb planted right in the bullseye was more effective than area bombing, which might well spare the most important building. For defence they trusted at first to two things, the great height at which they customarily flew, which would naturally increase the difficulties of the *flak* gunners, and to their heavy armament of 13 machine guns, nearly all of 0.5in. calibre. Without doubt they shot down a great many German fighters, but they also lost a number of heavy bombers. They ultimately found salvation in the employment of long-range escort fighters, the Mustang and the Thunderbolt, to which they fitted long-range tanks of British make. The Mustang, in particular, proved a most admirable machine. It had been designed in America to a British specification, and it was employed by our Fighter Command as well as by the Americans.

The most remarkable medium bomber of the war was the twin-engined De Havilland Mosquito, which could carry a 4,000-lb. bomb to Berlin and return to its base the same night. It was not only a bomber. It could be produced as a long-range fighter, and in that form it was used much by Fighter Command as a night intruder. Coastal Command also found plenty of use for the Mosquito, and so it was valued by all three operational Commands.



**SPOT SHOOTING : Fortresses of the 8th U.S.A.A.F. make a daylight attack on the Focke-Wulf aircraft factory at Marienburg in October, 1943.**

Offensive air operations were not undertaken only by Bomber Command. Once the Battle of Britain had been decisively won (and incidentally that battle is a shocking bad example of air power in attack), Fighter Command also began to assume an offensive role. At one time it could truly be said that fighters were purely defensive weapons—perhaps the only purely defensive weapons in the world. But presently that characteristic of the class was changed. The fighter-bomber proved to be more effective than the Stuka in attacking ground troops; but that class will be considered in a later article. When Britain no longer needed protection from the attacks of the *Luftwaffe*, Fighter Command declined to kick its heels in idleness. It began to send formations across the Channel, looking for trouble in France. Its machines were by then mostly armed with 20 mm. cannon, and with them the Spitfires and Mustangs attacked railway engines and transport trains. This was the beginning of a policy of interfering with German communications in occupied countries, which presently swelled to enormous dimensions. But at first the main object of our fighters was to provoke enemy fighters to meet them in combat. The German pilots were doubtless willing enough, but their authorities said "No." Fighters were getting precious in the Fortress of Europe, and must not be risked except for a very good reason.

So medium bombers were sent out with the Spitfires and Mustangs, and then the Germans found that they must offer opposition. Our losses were proportionately higher than in the Battle of Britain, because the pilots who baled out were made prisoners of war. But the R.A.F. could afford their losses better than the *Luftwaffe* could afford theirs. British production was getting into full swing, and a Spitfire was no longer a valuable rarity. We could even spare Spitfires to the French when they attacked Corsica.

When the Allies swept into Germany and saw from the ground the damage which bombing had done to innumerable German cities, they were astonished. The photographs taken from a height of five miles had never told the full story. The Ruhr had been blasted to destruction, and its industries could give no help to German defence. The coal mines were still working and the stacks of coal had piled up on all sides. That coal will set many home fires burning in liberated countries. The bombing of communications had made it impossible to distribute the output. But that, too, is another story.

## CIVIL AIRWORTHINESS CONTROL

THE Air Registration Board, it is announced, are issuing the first parts of the British civil airworthiness requirements. By this they are starting to implement recommendations made ten years ago to allow the British aircraft industry to control itself.

Mr. James Norman, surveyor in charge of the Board's damage survey department, told a P.A. reporter last week that the Air Ministry had some very detailed requirements for civil aircraft, but the industry did not like Government control, and about 1935 the Government set up a committee presided over by Lord Gorell to investigate the industry's complaints. This committee recommended that the control regarding technical requirements for civil aircraft should be taken out of the hands of Government departments and vested in a body formed similar to Lloyd's Register of Shipping.

As a result the A.R.B. was brought into being and is issuing two series of requirements. Those so far issued set the official standard which will have to be complied with in aircraft seeking British airworthiness certificates.

Mr. Norman pointed out that when, in pre-war days, the Air Ministry used to control all civil aircraft, it more or less took all responsibility itself. But the Air Registration Board was trying to implement the recommendations of the Gorell Committee that control should be eased off and the industry left to control itself as far as was possible.

With that object in view the Board was not setting forth detailed requirements, but was merely laying down broad principles.

Thunderbolts of the U.S. Tenth Army Air Force silhouetted against the mountainous country of northern Burma.

# SERVICE AVIATION

## *Royal Air Force and Fleet Air Arm News and Announcements*

## *Awards*

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations :—

### Distinguished Service Order

Major J. E. GASSON, D.F.C., S.A.A.F., 92 Sqn.—Since being awarded the Distinguished Flying Cross, this officer has participated in a large number of varied sorties. On several occasions towards the end of 1944 he led formations of aircraft in attacks against enemy strong points with excellent results. On one occasion in December, 1944, Major Gasson came down to a very low level, alone, to locate an enemy gun position. Although considerable fire was directed at his aircraft, he rejoined his flight, which he led into the attack, and all three guns were destroyed. On two other occasions, Major Gasson led his flight with great skill in close support of operations by our ground forces. This officer has displayed exceptional gallantry and determination in the execution of his attacks on the enemy. Much of the success of the squadron can be attributed to his undoubted ability.

Flt Lt. D. A. OXBY, D.F.C., D.F.M., R.A.F.V.R., 219 Sqn.—As observer, this officer has displayed skill of the highest order. He has taken part in a very large number of sorties and has assisted in the destruction of 21 enemy aircraft. These successes are an outstanding tribute to his great ability, praiseworthy courage and iron determination.

### Bar to Distinguished Flying Cross

Major W. WELGEMOED, D.F.C., S.A.A.F., No. 40 (S.A.A.F.) Sqn.—This officer's work has been outstanding at all times. Since the award of the D.F.C. he has completed a large number of sorties and, as a flight commander, has proved an invaluable asset to his squadron. In April, 1944, while flying on reconnaissance near Anzio, his aircraft was attacked by enemy fighters. Severe damage was sustained before the engagement was broken off. During the battle for the Gothic Line, Major Welgemoed on several occasions flew through heavy defences at a very low altitude to locate his targets, on one occasion, sustaining severe damage to his aircraft before successfully completing his mission. His exceptional keenness and efficiency as a leader have always been an inspiration to his pilots.

Flt. Lt. R. G. PRICE, D.F.C., R.A.F., No. 248 Sqn.—Since being awarded the Distinguished Flying Cross this officer has participated in numerous attacks on enemy shipping. All these operations have demanded the highest standard of skill. The successes obtained reflect the greatest credit on the ability shown by Flight Lieutenant Price, whose navigation in difficult circumstances has been faultless. This officer has proved himself to be a most valuable and courageous member of aircraft crew.

Flt. Lt. F. J. RUSH, D.F.C., R.C.A.F., and F/O. J. P. LUCY, D.F.C., R.A.A.F., both of No. 502 Sqn.—As pilot and navigator respectively, these officers have displayed the highest standard of skill and determination in attacks on enemy shipping. One night in February, 1945, they successfully attacked a large merchantman sailing in convoy. In spite of fierce anti-aircraft fire from a number of enemy ships, a perfect bombing run was executed. Several hits were obtained on the target, which soon became enveloped in flames. These officers displayed great skill and courage, and set a splendid example throughout.

Flt. Lt. P. G. K. WILLIAMSON, D.F.C., R.A.F.V.R., No. 219 Sqn.—As pilot and observer of aircraft respectively, these officers have taken part in very many sorties, some of them in most adverse weather. They have shown a high degree of skill and courage during these operations, and have destroyed four enemy aircraft. These successes have brought Flight Lieutenant Williamson's total victories to nine.

Sqn. Ldr. M. G. BROWN, D.F.C., R.C.A.F., No. 400 (R.C.A.F.) Sqn.—Since the award of the Distinguished Flying Cross, Sqn. Ldr. Brown has continued to display courage and devotion to duty of a high order. His work has set an outstanding example to all the pilots in the squadron.

Act. Sqn. Ldr. J. M. BAILEY, D.F.C., R.N.Z.A.F., No. 75 (N.Z.) Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Bailey has participated in many sorties against some of the most heavily defended targets in enemy territory. He has consistently displayed a high standard of courage and skill, qualities which were well evident on a recent occasion in February, 1945, when he led the squadron in an attack on an oil refinery at Osterfeld. Whilst over the target the aircraft was hit in several places. The starboard inner engine was rendered unserviceable and the propeller had to be feathered. In spite of this, Sqn. Ldr. Bailey executed a successful attack.

Act. Sqn. Ldr. K. J. FOSTER, D.F.C., R.A.F.V.R., No. 97 Sqn. (since deceased).—This officer has taken part in numerous operational missions, which have included most of the recent major operations against German targets. On three occasions he has rendered valuable aid to the squadron by acting as captain of inexperienced crews. He is a very keen captain of aircraft and a skilled and experienced navigator whose initiative and resource have been highly commendable.

Act. Sqn. Ldr. R. A. MCKINNA, D.F.C., R.A.F.V.R., No. 97 Sqn. (since deceased).—As air gunner and gunnery leader, this officer has taken part in numerous operational missions against the enemy, in the course of which he has invariably displayed the utmost courage, fortitude and devotion to duty.

Flt. Lt. G. R. CRAKANTHORP, D.F.C., R.A.F.V.R., No. 542 Sqn.—Flt. Lt. Crakanthorp is an operational pilot of exceptional skill and ability who, during two strenuous tours of duty, has always displayed the greatest keenness. Since the award of the Distinguished Flying Cross he has participated in photographic reconnaissance sorties to all the major German targets. In November, 1944, he completed a particularly outstanding mission to Munich, which involved flying his aircraft a very great distance in thick cloud. Despite this all the principal objectives were successfully covered, the final target, a very heavily defended area, being photographed from a low altitude beneath the cloud.

F/O. G. CRIBBS, D.F.C., R.A.F.V.R., No. 16 Sqn.—Since the award of the Distinguished Flying Cross, F/O. Cribbs has completed many hazardous missions in an extremely able manner, invariably returning with excellent photographs. In January, 1945, he was detailed to take photographs in the vicinity of Rotterdam. Low clouds made it necessary for him to fly at a low level over strongly defended areas to attain his objective. Despite this, the sortie was successfully completed. Throughout his tour F/O. Cribbs has displayed outstanding skill and devotion to duty.

Flt. Lt W. J. BANKS, D.F.C., R.C.A.F., No. 412 (R.C.A.F.) Sqn.—Since being awarded the Distinguished Flying Cross this officer has taken

# SERVICE AVIATION

part in many more operational sorties. In September, 1944, he participated in the Arnhem para-troop landings, and in one combat against a superior force he destroyed two enemy aircraft. On the following day he destroyed another two in air combat, bringing his total victories to at least ten enemy aircraft destroyed. On another occasion the propeller of this officer's aircraft was hit by fire from the enemy's defences and half of one blade was knocked off, but with great skill he brought his aircraft safely back to base. At all times Flt. Lt. Banks has set a fine example of courage, efficiency and leadership.

Flt. Lt. C. W. Fox, D.F.C., R.C.A.F., No. 412 (R.C.A.F.) Sqn.—Since August, 1944, this officer has led his section against a variety of targets, often in the face of intense anti-aircraft fire. He has personally destroyed or damaged 22 locomotives and 34 enemy vehicles, bringing his total to 153 vehicles destroyed or damaged. In addition, he has destroyed at least a further three enemy aircraft and damaged two others. In December, 1944, Flt. Lt. Fox led his squadron on an attack against enemy airfields in the Munster area and personally destroyed another hostile aircraft, bringing his total to four. Through his quick and accurate reporting a further four enemy aircraft were destroyed. Since the award of the Distinguished Flying Cross this officer has continued to display outstanding skill, coolness and determination.

Flt. Lt. J. M. G. Plamondon, D.F.C., R.C.A.F., No. 193 Sqn.—Since being awarded the Distinguished Flying Cross this officer has led a large number of operational sorties against a wide variety of enemy targets, including enemy strong points and lines of communication and in close support of the Army. As commanding officer he has set a high standard, and his brilliant leadership, great courage and determination have been reflected in the operational efficiency of his squadron, which since June, 1944, have destroyed or damaged 200 enemy fighting vehicles. Flt. Lt. Plamondon has himself destroyed one Messerschmitt 109 in air combat.

Act. Sqn. Ldr. T. L. Hildrew, D.F.C., R.A.F.V.R., No. 105 Sqn.—Sqn. Ldr. Hildrew has taken part in numerous operational sorties since the award of the Distinguished Flying Cross. Throughout the whole of his operational career he has shown himself to be an extremely capable and skilful navigator whose great determination and cool courage have produced consistent fine results.

## Distinguished Flying Cross

Act. Wing Cdr. C. W. Bromley, A.F.C., R.A.F.O., No. 35 Sqn.
Act. Wing Cdr. J. Clift, O.B.E., R.A.F.O., No. 139 Sqn.
Act. Sqn. Ldr. R. B. Clark, A.F.M., R.A.F.V.R., No. 115 Sqn.
Act. Sqn. Ldr. F. G. Daw, R.A.F.O., No. 578 Sqn.
Act. Sqn. Ldr. W. E. M. Eddy, D.S.O., R.A.F.V.R., No. 139 Sqn.
Act. Sqn. Ldr. J. Flint, G.M., D.F.M., R.A.F.V.R., No. 50 Sqn.
Act. Sqn. Ldr. D. G. Griffiths, R.A.F.V.R., No. 23 Sqn.
Act. Sqn. Ldr. P. W. P. Lewis, R.A.F.V.R., No. 149 Sqn.
Act. Sqn. Ldr. G. W. O'Donovan, D.S.O., R.A.F.V.R., No. 582 Sqn.
Flt. Lt. R. J. Cook, D.F.M., R.A.F.V.R., No. 608 Sqn.
Flt. Lt. R. R. Gee, R.A.F.V.R., No. 161 Sqn.
Flt. Lt. O. A. Hardy, R.A.F.V.R., No. 550 Sqn.
Flt. Lt. W. McK. Hodgson, A.F.M., R.A.F.V.R., No. 109 Sqn. (Since deceased.)
Flt. Lt. R. C. Instbell, R.A.F.V.R., No. 431 (R.C.A.F.) Sqn.
Flt. Lt. J. Jackson, R.A.F.V.R., No. 156 Sqn.
Sqn. Ldr. V. Cashmore, R.A.A.F., No. 454 (R.A.A.F.) Sqn.
Sqn. Ldr. G. A. Gray, R.A.A.F., No. 454 (R.A.A.F.) Sqn.
Flt. Lt. D. C. Dunn, R.A.A.F., No. 72 Sqn.
Flt. Lt. G. E. Walker, R.A.A.F., No. 541 Sqn.
Act. Flt. Lt. H. Brown, R.A.A.F., No. 145 Sqn.
F/O. K. Coulter, R.A.A.F., No. 612 Sqn.
F/O. M. B. Jones, R.A.A.F., No. 267 Sqn.

The badges of (left) No. 515 Squadron, R.A.F. "Celeriter Ferite Ut Hostes Necetis" (Strike Swiftly to Kill the Enemy). (Centre) No. 190 Squadron, R.A.F. "Ex Tenebris" (Through Darkness). (Right) Central Flying School, Southern Rhodesia, R.A.F. "Doctorem Docemus" (We Teach the Teacher).

F/O. A. J. H. Taylor, R.A.A.F., No. 72 Sqn
Act Sqn. Ldr. D. Goldberg, R.C.A.F., No. 417 (R.C.A.F.) Sqn.
Act. Flt. Lt. A. D. Taylor, R.C.A.F., No. 92 Sqn.
F/O. R. S. Harrison, R.C.A.F., No. 144 Sqn.
F/O. W. J. Hartrick, R.C.A.F., No. 120 Sqn.
P/O. C. E. Hightower, R.C.A.F., No. 16 Sqn
W/O. O. L. Bliss, R.C.A.F., No. 35 Sqn
F/O. R. H. Newton, R.N.Z.A.F., No. 112 Sqn.
P/O. C. G. Baker, R.N.Z.A.F., No. 18 Sqn.
Act. Sqn. Ldr. H. O. Gooding, R.C.A.F., No. 440 (R.C.A.F.) Sqn.
Act. Sqn. Ldr. R. F. Reid, R.C.A.F., No. 438 (R.C.A.F.) Sqn.
F/O. D. M. Mackenzie, R.C.A.F., No. 410 (R.C.A.F.) Sqn.
Sqn. Ldr. R. C. Young, R.N.Z.A.F., No. 487 (R.N.Z.A.F.) Sqn.
Flt. Lt. A. B. Stead, R.N.Z.A.F., No. 495 (R.N.Z.A.F.) Sqn.
F/O. W. A. Hart, R.N.Z.A.F., No. 486 (R.N.Z.A.F.) Sqn.
Act. Sqn. Ldr. A. J. Pinhorn, R.A.F.O., No. 205 Sqn. (since deceased).
F/O. G. D. A. Lundon, R.A.F.V.R., No. 172 Sqn. (since deceased).
F/O. R. G. Stringer, R.A.F.V.R., No. 248 Sqn. (since deceased),
P/O. J. D. Maie, R.A.F.V.R., No. 540 Sqn. (since deceased).
Flt. Lt. M. J. M. Lagesse, R.A.F.V.R., No. 139 Sqn.
F/O. F. Chadwick, R.A.F.V.R., No. 58 Sqn.
F/O. J. Dunn, D.F.M., R.A.F.V.R., No. 139 Sqn. (since deceased).
F/O. R. S. Flight, R.A.F.V.R., No. 140 Sqn.
F/O. N. J. Furlong, R.A.F.V.R., No. 10 Sqn. (since deceased).
F/O. E. S. Gates, R.A.F.V.R., No. 613 Sqn.
F/O. A. Livesey, R.A.F.V.R., No. 405 (R.C.A.F.) Sqn.
F/O. B. D. Mackins, R.A.F.V.R., No. 140 Sqn.
F/O. F. J. Pile, No. 47 Sqn. (since deceased)
F/O. H. J. Pringle, R.A.F.V.R., No. 196 Sqn.
F/O. E. C. Stanyard, R.A.F.V.R., No 98 Sqn.
F/O. R. C. Williams, R.A.F.V.R., No. 2 Sqn.
P/O. J. D. Bradford, R.A.F.V.R., No. 97 Sqn. (since deceased).
P/O. G. D. Everson, R.A.F.V.R., No. 613 Sqn.
P/O. J. Hamilton, R.A.F., No. 86 Sqn.
P/O. J. A. D. Meecham, R.A.F.V.R., No. 247 Sqn.
P/O. R. J. S. Robertson, R.A.F.V.R., No. 540 Sqn.
P/O. J. White, R.A.F.V.R., No. 613 Sqn.
W/O. S. Croft, R.A.F.V.R., No. 247 Sqn.
W/O. F. H. Moseley, R.A.F.V.R., No. 544 Sqn.
W/O. L. Stevenson, (later P/O.), R.A.F.V.R., No. 97 Sqn. (since deceased).
W/O. E. Blanchard, R.A.F., No. 51 Sqn.
Flt. Lt. R. S. Bue, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. G. C. Cambell, R.C.A.F., No. 9 Sqn.
Flt. Lt. E. T. Cook, R.C.A.F. No. 156 Sqn.
Flt. Lt. L. A. Friedman, R.C.A.F., No 405 (R.C.A.F.) Sqn.
Flt. Lt. G. K. A. Haslop, R.C.A.F., No. 420 (R.C.A.F.) Sqn.
Flt. Lt. D. T. Hepburn, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. H. J. Hogarth, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
Flt. Lt. E. L. Horton, R.C.A.F., No. 578 Sqn.
Flt. Lt. K. G. House, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Flt. Lt. J. D. V. Lariviere, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. E. R. H. Y. Lefebvre, R.C.A.F., No. 42 (R.C.A.F.) Sqn.
Flt. Lt. D. F. Poole, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Flt. Lt. H. A. F. Poyntz, R.C.A.F., No. 571 Sqn.
Flt. Lt. E. Thorson, R.C.A.F., No 408 (R.C.A.F.) Sqn.
Flt. Lt. A. C. Wallace, R.C.A.F., No. 109 Sqn.
Act. Flt. Lt. D. R. Anderson, R.C.A.F. No. 582 Sqn.
Act. Flt. Lt. W. B. Brittain, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. R. Edmondston, R.C.A.F., No. 428 (R.C.A.F.) Sqn.
Act. Flt. Lt. A. H. Emmott, R.C.A.F., No. 635 Sqn.
Act. Flt. Lt. G. E. Foster, R.C.A.F., No. 156 Sqn.
Act. Flt. Lt. K. V. Gadd, R.C.A.F., No. 115 Sqn.
Act. Flt. Lt. C. B. Gray, R.C.A.F., No. 429 (R.C.A.F.) Sqn.
Act. Flt. Lt. W. H. Hall, R.C.A.F., No. 15 Sqn.
Act. Flt. Lt. G. N. Kilgour, R.C.A.F., No. 227 Sqn.
F/O. W. F. Cox, R.C.A.F., No. 550 Sqn.
F/O. B. W. Flanagan, R.C.A.F., No. 426 (R.C.A.F.) Sqn.
F/O. W. V. A. Glover, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
Major W. H. Hoffe, S.A.A.F., No. 152 Sqn.
Act. Flt. Lt. G. H. Lee, R.A.F.V.R., No. 49 Sqn.
Act Flt. Lt. H. Mills, D.F.M., R.A.F.V.R., No. 105 Sqn.
Act. Flt. Lt. F. A. Pearson, R.A.F.V.R.
Act. Flt. Lt. V. F. G. Prowse, R.A.F.V.R., No. 161 Sqn.
Act. Flt. Lt. K. J. Ryall, R.A.F., No. 617 Sqn.
Act. Flt. Lt. S. A. R. Taylor, D.F.M., R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. H. Watkins, R.A.F.V.R., No. 61 Sqn.
Act. Flt. Lt. H. Winder, R.A.F.V.R., No. 626 Sqn.
F/O. W. Alliston, R.A.F.V.R., No. 10 Sqn.
F/O. A. F. Bessemer, R.A.F.V.R., No. 149 Sqn.
Flt. Lt. S. W. Rees, R.A.A.F., 600 Sqn.
F/O. D. C. Bartlett, R.A.F.V.R., 600 Sqn.
Act. Flt. Lt. E. J. Fletcher, R.A.A.F., 178 Sqn.
F/O. J. R. Brewer, R.A.F.V.R., 600 Sqn.
F/O. G. W. Judd, R.A.A.F., 600 Sqn.
F/O. G. D. Cameron, R.C.A.F., 401 (R.C.A.F.) Sqn.
F/O. R. H. Laurence, R.C.A.F. 439 (R.C.A.F.) Sqn.
F/O. W. Sawers, R.C.A.F., 414 (R.C.A.F.) Sqn.
Act. Flt. Lt. F. J. Lawrenson, R.A.A.F. 450 (R.A.A.F.) Sqn.
Capt. E. Swales, S.A.A.F., 582 Sqn.
F/O. W. H. Cornelius, R.A.F.V.R., 116 Sqn.
F/O. J. W. Garland, R.C.A.F., 80 Sqn.
Act. Sqn. Ldr. P. M Bezencenet, R.A.F.V.R., 208 Sqn.
Flt. Lt. P. F. Raw, R.A.A.F., 178 Sqn.
Flt. Lt. D. C. Gordon, R.C.A.F., 442 (R.C.A.F.) Sqn.
W/O. A. A. L. Andersen, R.A.A.F., 582 Sqn.
Flt. Lt. W. Simpson, R.A.A.F., No. 614 Sqn.
F/O. A. D. Lackey, R.A.A.F., No. 683 Sqn.
F/O. R. P. McMillan, R.A.A.F., No. 55 Sqn.
Flt. Lt. W. A. Irwin, R.C.A.F., No. 614 Sqn.
F/O. J. R. McLaughlin, R.C.A.F., No. 683 Sqn.
Act. Sqn. Ldr. B. M. O'Connor, R.N.Z.A.F., No. 70 Sqn.
Flt. Lt. R. W. Bailie, R.A.F.V.R., No. 69 Sqn.
Flt. Lt T. H. Bates, R.A.F.V.R., No. 74 Sqn.
Flt. Lt. S. J. Eaton, R.A.F.V.R., No. 257 Sqn.
Flt. Lt. H. D. Leventon, R.A.F. (Lt.—The Lancashire Fusiliers) No. 4 Sqn.
Flt. Lt. G. A. Percival, R.A.F.V.R., No. 2 Sqn.
Flt. Lt. D. Rowcliffe, R.A.F. (Lt.—The Duke of Wellington's Regiment (West Riding), No. 4 Sqn.
F/O. A. G. Brown, R.A.F.V.R., No. 88 Sqn.
F/O. S. W. Moulds, R.A.F.V.R., No. 21 Sqn.

The badges of (left) No. 185 Squadron, R.A.F. "Ara Fejn Hu" (Where is it). (Centre) No. 127 Squadron, R.A.F. "Eothen" (Out of the East). (Right) No. 168 Squadron, R.A.F. "Rerum Cognoscere Causas" (To Learn the Reason of Things).

# SERVICE AVIATION

F/O C F RELGRAVE R.A.F.V.R., No 487 (R.N.Z.A.F.) Sqn.
F/O L ROBERTS, R.A.F.V.R., No. 604 Sqn.
F/O J S SMITH R.A.F.V.R., No 604 Sqn (since deceased).
F/O A F TUCZEK, R.A.F.V.R., No. 98 Sqn.
P/O E H JOHNSON, R.A.F.V.R., No. 69 Sqn
Flt. Lt. I. J. EWING, R.A.A.F., No. 40 Sqn
F/O T T HALL, R.A.A.F., No. 175 Sqn
F/O F E FORREST, R.A.F.V.R., No. 219 Sqn.—For citation see Flt Lt P G K Williamson D.F.C
Flt. Lt. R. BREARLEY, R.A.F.V.R., No. 141 Sqn
F/O. J. SHELDON, R.A.F.V.R., No. 141 Sqn
Act. F/O. K. E. ROBERTS, R.A.A.F., No. 101 Sqn
W/O W. GILL R.A.F., No. 502 Sqn.
F/O. G. H. SMITH, R.A.F.V.R., No. 640 Sqn.
F/O. L. E. CHAPMAN, R.A.F.V.R., No 622 Sqn
F/O. C. R. CLARK, R.A.F.V.R., No. 635 Sqn.
F/O. B. T. CLOUGH, R.A.F.V.R., No 51 Sqn
F/O. J. L. R. COLEMAN, R.A.F., No 578 Sqn
F/O. H. J. CROW, R.A.F.V.R., No. 192 Sqn.
F/O R H. EDMUNDSON, R.A.F.V.R., No. 514 Sqn.
F/O G U EVANS R.A.F.V.R., No 460 (R.A.A.F.) Sqn.
F/O. N. S. EVANS, R.A.F.V.R., No. 78 Sqn
F/O A. G. FRISH, R.A.F.V.R., No 103 Sqn
F/O C. R. GODFREY, R.A.F.V.R., No. 635 Sqn.
F/O. S. D. GOOD, R.A.F.V.R., No. 44 Sqn.
F/O. G. L. GRANTHAM, R.A.F.V.R., No. 578 Sqn
F/O. A. G. HARRISON, R.A.F.V.R., No 83 Sqn
F/O. N. P. HIBBERT, R.A.F.V.R., No 156 Sqn
F/O. W. E. JEYNES, R.A.F.V.R., No. 90 Sqn.
F/O W G. JOHNSON, R.A.F.V.R., No 101 Sqn
F/O. O M. C. JONES, R.A.F.V.R., No 153 Sqn
F/O D G. KERR, R.A.F.V.R., No. 78 Sqn.
F/O F. G. KITSON, R.A.F.V.R., No. 150 Sqn.
F/O. J. H. KNIGHT R.A.F.V.R. No. 463 (R.A.A.F.) Sqn.
F/O J L. LANE, R.A.F., No. 625 Sqn
F/O R. LAWS, R.A.F.V.R., No. 90 Sqn.
F/O. N. LAYDEN, R.A.F.V.R., No. 576 Sqn
F/O G. P. LEVETT, R.A.F.V.R., No. 158 Sqn
F/O. N. G. MASON, R.A.F.V.R., No. 78 Sqn.
F/O. N. McGREGOR, R.A.F.V.R., No. 102 Sqn
F/O. A. H. MILES R.A.F.V.R., No. 578 Sqn.
F/O. T. MOORE, R.A.F., No 214 Sqn
F/O. T. M. V. MORROW, R.A.F.V.R., No 608 Squ
F/O J. F. MURISON, R.A.F.V.R., No 12 Sqn
F/O. T. E. NOYON, R.A.F.V.R., No. 78 Sqn
F/O F. O. PARKINSON, R.A.F.V.R., No. 100 Sqn
F/O. P. J. PARNHAM, R.A.F.V.R., No. 166 Sqn
F/O. G. C. POOLE, R.A.F.V.R., No. 44 Sqn
F/O W. C. J. RAY, R.A.F.V.R., No. 195 Sqn.
F/O. F. RICHARDSON, R.A.F.V.R., No. 186 Sqn
F/O. F. SANDIFORD, R.A.F., No. 90 Sqn.
F/O. W. SMALL, R.A.F.V.R., No. 166 Sqn
F/O. O. W. SOUTHFIELD, R.A.F.V.R., No. 57 Sqn
F/O. G. D. STEWART R.A.F.V.R., No. 405 (R.C.A.F.) Sqn
F/O. W. A. STEWART, R.A.F., No 576 Sqn
F/O. R. TOTHAM, R.A.F.V.R., No 101 Sqn.
F/O. K. H WALKER, R.A.F.V.R., No. 161 Sqn.
F/O. A. O F. WATT, R.A.F.V.R., No. 7 Sqn.
F/O. F. H. A. WATTS, R.A.F.V.R., No. 617 Squ.
F/O. A. C. WHITEHEAD, R.A.F., No 466 Sqn.
F/O A. G. WRIGHT, R.A.F., No. 35 Sqn.
Act. F/O. E. ATKINSON, R.A.F.V.R., No. 77 Sqn
Act. F/O. S. BOWATER, R.A.F.V.R., No. 101 Sqn
Act. F/O. A. T. DUGDALE, R.A.F.V.R., No 195 Sqn.
Act. F/O. F. HEALD, R.A.F.V.R., No. 514 Sqn.
Act. F/O. L. J. MELLING, R.A.F.V.R., No. 635 Sqn.
Act. F/O. G. MYLES, R.A.F.V.R., No. 622 Sqn.
Act F/O. W T RAMSDEN, R.A.F.V.R. No. 100 Sqn.
Act. F/O A. J ROWLEY R.A.F.V.R. No. 76 Sqn
Act. F/O L M SUMMERS, R.A.F.V.R., No 207 Sqn.
Act F/O. H C SUTTON R.A.F.V.R., No. 625 Sqn.
Act. F/O. R. WAKEMAN, R.A.F.V.R., No. 640 Sqn
P/O J. W. ARCHIBALD, R.A.F.V.R., No. 214 Sqn
P/O. N. C. BRADGATE, R.A.F.V.R., No. 149 Sqn
P/O. C. BRAMELD, R.A.F.V.R., No. 109 Sqn.
P/O. J. B BRIGHT, R.A.F.V.R., No. 626 Sqn.
P/O. B A BUTTERFIELD, R.A.F.V.R., No. 156 Sqn.
P/O P. H C CHARNOCK, R.A.F.V.R., No 166 Sqn
P/O G CHRYSTALL, R.A.F.V.R., No. 158 Sqn
P/O S. L. CONLEY, R.A.F.V.R., No. 635 Sqn.
P/O W W. COTON, R.A.F.V.R., No. 149 Sqn.
P/O. B. S. COX, R.A.F.V.R., No 467 (R.A.A.F.) Sqn.
P/O D. H C. WILLOUGHBY, R.A.F.V.R., No 405 (R.C.A.F.) Sqn
W/O W. H. BISHOP, R.A.F.V.R., No. 640 Sqn
W/O. D BROWN, R.A.F.V.R., No. 635 Sqn
W/O D CLARKE, R.A.F.V.R., No. 218 Sqn.
W/O J CRUMP, R.A.F.V.R., No. 156 Sqn.
W/O G S. H DAVIES, R.A.F.V.R., No 622 Sqn
W/O A C ELPHICK, R.A.F., No 149 Sqn.
W/O J. D. S GARRATT, R.A.F.V.R., No. 109 Sqn
W/O R D HAMILTON, R.A.F.V.R., No. 90 Sqn
W/O. B HARTHILL, R.A.F.V.R., No. 97 Sqn
W/O H L HORNE, R.A.F.V.R., No. 35 Sqn
W/O W. J JOHN, R.A.F., No. 115 Sqn.
W/O R M. H. KEARY, R.A.F.V.R., No. 625 Sqn
W/O C W NEWMAN, R.A.F., No. 635 Sqn.
W/O R N. NOYE, R.A.F.V.R., No 156 Sqn.
W/O A McR. ROBERTSON, R.A.F., No. 7 Squ
W/O J. D. SANDERS, R.A.F.V.R., No. 156 Sqn
W/O. H SMITH, R.A.F.V.R., No. 156 Sqn.
W/O. R V STEWART, R.A.F.V.R., No 149 Sqn
W/O R. S. SWOFFER, R.A.F.V.R., No 635 Sqn
W/O W. J. THOMPSETT, R.A.F.V.R., No. 90 Sqn.
W/O G P THOMSON R.A.F.V.R., No. 35 Sqn
W/O. R J TORBITT, R.A.F.V.R. No. 75 (N.Z.) Sqn.
Act. W/O J CUMMING, R.A.F.V.R., No. 7 Sqn
Act. W/O T. C DAVIES R.A.F.V.R. No 582 Sqn.
Act. W/O B. G JOHNSON R.A.F.V.R. No 582 Sqn.
Act. W/O J. L MACDONALD R.A.F.V.R. No 35 Sqn.
Act W/O. I. K McGREGOR R.A.F.V.R., No. 35 Sqn.
Act. W/O S STABLING, R.A.F.V.R., No 7 Sqn
Act W/O. E. C B WOOD R.A.F.V.R., No 76 Sqn.
P/O B. F. DUNSTER R.C.A.F. No. 420 (R.C.A.F.) Sqn.
P/O. N. A. FRANCIS, R.C.A.F., No 431 (R.C.A.F.) Sqn.
P/O F G. CRIME, R.C.A.F., No. 578 Sqn
P/O. W. A. GUTHRIE, R.C.A.F. No 578 Sqn
P/O. D. G. IRWIN R.C.A.F. No 426 (R.C.A.F.) Sqn.
P/O. P. C. KANAS, R.C.A.F., No 102 Sqn
P/O E. G. KLUCZNY, R.C.A.F., No. 90 Sqn
P/O R. H. MACLEOD, R.C.A.F., No. 635 Sqn
P/O. W. A. McLEOD, R.C.A.F., No 415 (R.C.A.F.) Sqn.
P/O R R. McKENNEY, R.C.A.F., No 427 (R.C.A.F.) Sqn.
P/O. L. E. MATTE, R.C.A.F., No. 103 Sqn
P/O. C B. MORRISON, R.C.A.F., No. 640 Sqn
P/O. L. D. NICKEL, R.C.A.F., No. 35 Sqn
P/O. P. A. ROBERTSON, R.C.A.F., No 156 Sqn
P/O. J. R. ROSS, R.C.A.F., No. 7 Sqn
P/O. C E SCARFE, R.C.A.F., No 405 (R.C.A.F.) Sqn
P/O. D. A. SHEPHERD, R.C.A.F., No 431 (R.C.A.F.) Sqn.
P/O L. B. STEDMAN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
W/O. G. BOVA, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. J. P. McDONNELL, R.N.Z.A.F., No. 90 Sqn.
F/O. W. F. McELWAIN, R.N.Z.A.F., No. 166 Sqn.
F/O. J. D. MERCIER, R.N.Z.A.F., No. 7 Sqn.
F/O. R. A. RAMSAY, R.N.Z.A.F., No. 75 (N.Z.) Sqn.
F/O. R. V. SIGNAL, R.N.Z.A.F., No. 149 Sqn.
F/O. E. S. SNOWDEN, R.N.Z.A.F., No. 7 Sqn.
F/O. W. L. STEWART, R.N.Z.A.F., No. 218 Sqn.
F/O. W. G. WINCHESTER, R.N.Z.A.F., No 149 Sqn.
P/O. J. B. CAUTY, R.N.Z.A.F., No. 90 Sqn
P/O. A. G. JAMIESON, R.N.Z.A.F., No. 149 Sqn.
P/O. M. E. MURRELL, R.N.Z.A.F., No. 77 Sqn.
P/O. M. R. OLIVER, R.N.Z.A.F., No. 514 Sqn.
P/O. J. F. ROSE, R.N.Z.A.F., No. 10 Sqn.
Flt. Lt. J. E. CREEPER R.C.A.F., No 429 (R.C.A.F.) Sqn
Act. Flt. Lt. A. M. MACDONALD, R.C.A.F. No 429 (R.C.A.F.) Sqn.
Flt. Lt. J M. MURPHY, R.C.A.F., No 427 (R.C.A.F.) Sqn.
Flt. Lt J. F SMART, R.C.A.F., No. 427 (R.C.A.F.) Sqn.
Flt. Lt. H W. MACDONALD, R.C.A.F., No 429 (R.C.A.F.) Sqn.
Act. Flt. Lt. R K. MITCHELL, R.C.A.F., No 429 (R.C.A.F.) Sqn.
F/O R. G. PETER, R.A.A.F., No 35 Sqn
Sqn. Ldr. W. G. ANDERSON, R.C.A.F., No. 424 (R.C.A.F.) Sqn
Act. Flt. Lt C. P. LUNDEEN, D.F.M., R.C.A.F., No 424 (R.C.A.F.) Sqn.
F/O. L. R. CLIFFORD, R.A.A.F. No 455 (R.A.A.F.) Sqn.
F/O. H. R. SPINK, R.A.A.F., No 455 (R.A.A.F.) Sqn.
F/O. T. E EVANS, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O J E NELSON, R.C.A.F., No 404 (R.C.A.F.) Sqn
F/O. A. A. ALEANDRI, R.A.F.V.R., No. 15 Sqn
F/O J ANDREWS, R.A.F.V.R., No 101 Sqn.
F/O P BAILEY, R.A.F.V.R., No. 102 Sqn.
F/O D P. BALCOMBE, R.A.F.V.R., No. 7 Sqn.
F/O A J. BAIL, R.A.F.V.R., No 625 Sqn
F/O R. BANNISTER, R.A.F.V.R., No 434 (R.C.A.F.) Sqn.
F/O. R. BATEMAN, R.A.F.V.R., No 619 Sqn.
F/O. T. BATLEY, R.A.F.V.R., No. 166 Sqn.
F/O H. G BERRIMAN, R.A.F.V.R., No 578 Sqn.
F/O. B BEVAN R.A.F.V.R., No 405 (R.C.A.F.) Sqn.

THE KING has been graciously pleased to approve the following awards:—

## Military Medal

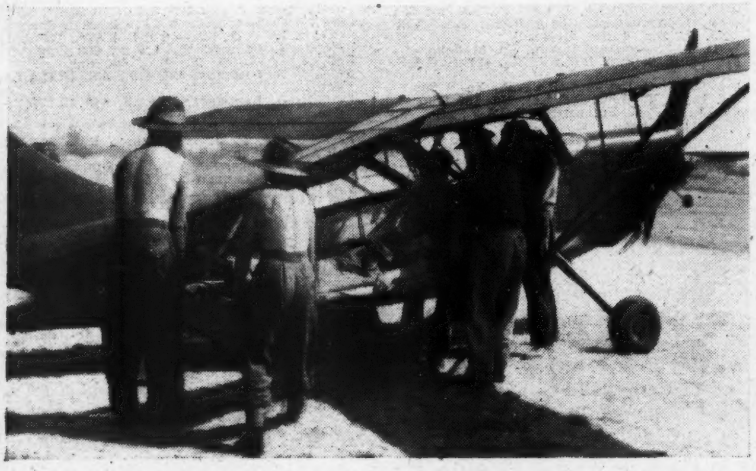
L.A/C. T G. DAVIES, R.A.F.V.R., R.A.F. Regiment.—In October, 1944, L.A/C. Davies' unit was at Wamel and was given a section of the front line to hold. The enemy, in strength, were on the opposite bank of the river Waal, roughly one kilometre away. One day orders were given to concentrate full fire power on a factory site known to contain valuable enemy equipment. Artillery support was to be given, and it was expected that counter fire would be received. At 15.00 hours the bombardment of the enemy position commenced. Shortly afterwards a bomb from one of the mortars failed to leave the muzzle completely and was liable to fall to the ground. Realising the grave danger, L.A/C. Davies, with great presence of mind and complete disregard of his own safety, grasped the bomb and threw it into a pond at the rear of the position. He then immediately continued to fire the mortar and so enabled his team to complete a rapid attack and to withdraw before counter fire was brought to bear against them. This airman's courage and sense of duty saved the lives of his colleagues and enabled an important enemy objective to be destroyed.

## George Medal

Sgt. R. F. DYSON, R.A.F., No. 189 Sqn.—One night in November, 1944, Sgt. Dyson was rear gunner of an aircraft detailed for a bombing attack and carrying a load of incendiaries, including those of the explosive type. Shortly after taking off, the aircraft crashed, broke up and burst into flames. On impact Sgt. Dyson was thrown, whilst still in the rear turret, 50 yards from the aircraft and, although badly shaken, was able to release himself with an axe. On hearing cries for help Sgt. Dyson at once went to the aid of his fellow crew-members, despite the fact that the aircraft wreckage was scattered over the area and was burning furiously, with incendiaries exploding and unexploded bombs lying both in and about the wreckage. He dragged the pilot from the immediate danger area around the aircraft and then ran back to continue his search for other members of the crew. He found the navigator, who was seriously injured and with his clothing on fire, about 15 yards from the aircraft. Sgt. Dyson put out the fire with his hands, receiving burns to both hands whilst doing so. Seeing assistance coming, he called out to attract attention to the navigator and himself. He was later found by rescue parties wandering around, suffering from shock. It was eventually found that more than half the bomb load had ignited. The danger was at times so great that members of the rescue parties were obliged to park vehicles 200 yards away and wait until the explosions and fires had moderated. Sgt. Dyson showed outstanding gallantry by his persistent efforts to help his comrades and undoubtedly saved the life of his pilot.

## O.B.E. (Mil.)

W/O. W. BARNETT, R.A.F.—For citation see Flt. Sgt. M. Anderson, B.E.M.



R.A.F. airmen helping to stow a casualty in a Stinson Sentinel L5 for removal to base hospital on the Burma front.

### B.E.M. (Mil.)

Flt. Sgt. M. ANDERSON, R.A.F.V.R.—In December, 1944, a Mitchell aircraft, which was fully loaded with petrol, caught fire soon after the take-off. The pilot, Flt. Sgt. Anderson, made a crash landing during which he and the navigator, W/O. Barnett, received head and other superficial injuries, burns and shock. They both left the wrecked aircraft by way of the escape hatch and then returned to rescue the radio operator who was trapped in the flames beneath the fuselage. W/O. Barnett, using great strength, lifted the rear portion of the fuselage whilst Flt. Sgt. Anderson crawled in and dragged the radio operator clear. They then assisted him away from the conflagration. They showed disregard for their own safety and injuries and, by their courage, undoubtedly saved the life of their comrade.

Act. Flt. Sgt. J. U. MARTIN, R.A.F.:—For a period of six weeks in 1944, Flt. Sgt. Martin was senior N.C.O. in charge of about 60 Bomb Disposal personnel engaged in mine clearance at an airfield. During this period he led his various sections in breaching, uncovering, neutralising and disposing of a total of 8,000 mines of all types. Many of the mines were booby-trapped, buried in ditches, under water, in thick, heavy undergrowth, tall grasses and in wooden enclosures in the vicinity of the hangars. These difficulties were surmounted with determination and, in spite of many mines being in a dangerous condition, all were detected and recovered with remarkable speed and efficiency and with no loss or accident to personnel. Flt. Sgt. Martin has shown leadership and courage of the highest order and, by his example to those under his control, he has had a direct influence on the success of this very hazardous operation. He contributed greatly to the task of bringing this important airfield into full operational use ahead of schedule. Flt. Sgt. Martin has been engaged continuously on bomb disposal duties since February, 1941.

Cpl. E. CHEETHAM, R.A.F., Communication Squadron.—In November, 1944, at an airfield, Corporal Cheetham and another airman were the first to arrive at a crashed and burning aircraft. Together they rescued one member of the crew, entering the flames in order to do so. Five days later, Cpl. Cheetham ran to an aircraft which had crashed a quarter of a mile from the airfield and, singlehanded, extricated two of the trapped members of the crew, afterwards assisting in the release of another. Whilst the wreckage of the aircraft was raised by makeshift levers, which continually slipped, Cpl. Cheetham remained under the debris alone, and after sawing away part of the structure, removed the fourth member of the crew. In December, 1944, an aircraft crashed and caught fire at the airfield. Cpl. Cheetham ran to the aircraft and made two attempts to free the navigator. During this time a petrol tank and an oxygen bottle exploded and ammunition detonated in all directions. Cpl. Cheetham only ceased his efforts when forcibly removed to hospital by two medical orderlies; he was suffering from shock, burns and eye injuries. On these three occasions he displayed great courage in dangerous circumstances.

## Roll of Honour

*Casualty Communiqué No.* 506.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of these, 195 are second entries giving later information of casualties published in earlier lists.

### Royal Air Force

KILLED IN ACTION.—F/O. T. J. S. Adam; Flt. Sgt. D. A. Boweren; Sgt. L. Carter; Flt. Lt. P. J. Drane, D.F.C.; Sqn. Ldr. R. J. G. Green, D.F.C.; Flt. Lt. F. G. Grillage; Flt. Lt. J. Maddocks; Flt. Sgt. J. Phillips; Flt. Lt. J. H. Robson, D.F.C.; Sgt. W. W. G. Smitton; F/O. K. Swale, D.F.C.; Sgt. J. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. L. Atherton; F/O. N. F. Blacklock; Sqn. Ldr. J. E. Blair, D.F.C., D.F.M.; Sgt. J. Buncher; Flt. Lt. M. I. Cox, A.F.C.; Sgt. J. Dorrity; F/O. C. S. Flint; Flt. Sgt. J. D. Hadlington; Sgt. J. A. Hargreaves; Sgt. A. E. Holland; Flt. Sgt. R. Keating; Sgt. J. J. Opie; Flt. Sgt. J. E. Paddison; Flt. Sgt. J. C. Rhodes; Sgt. S. G. Smith; Sgt. J. A. Warburton; Sgt. J. F. Weatherell; Flt. Sgt. G. Williams; Sgt. J. Wilson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. S. Aitchison; Sgt. E. Ashton; P/O. J. N. S. Ashton, D.F.M.; Sgt. W. Asburst; Flt. Lt. J. Baker, D.S.O., D.F.C.; Sgt. L. C. Barrett; W/O. S. Beaton; P/O. A. A. Bell; Flt. Sgt. H. G. Bell; Sgt. E. Bennett; Sgt. R. J. Bond; Sgt. S. J. A. Boon; Sgt. R. L. Bouttell; F/O. J. D. Bowmer; Sgt. G. H. Bradshaw; Sgt. R. A. Campbell; Sgt. G. F. Carter; Sgt. R. C. Carvell; Flt. Sgt. W. J. Catchpole; Sgt. J. J. Cassels; P/O. R. E. Chantler; Sgt. R. J. Charters; P/O. G. J. R. Clark; P/O. J. S. MacL. Clarke; Sgt. G. T. Clouter; F/O. J. A. Collis; Flt. Sgt. T. A. Colman; Flt. Sgt. J. Connelly; Flt. Sgt. A. M. Cook; P/O. K. F. Cornwell, D.F.C.; P/O. R. Dawson; F/O. H. G. Dean; Flt. Lt. A. G. Dickerson; Flt. Sgt. S. W. Downes; Sqn. Ldr. W. F. Dredge; F/O. D. McM. Drew; Flt. Sgt. R. Dudley; Sgt. H. L. Duff; Flt. Sgt. T. R. Dutton; Sgt. A. V. R. Edwards; Sgt. D. J. Edwards; W/O. E. T. Edwards; Sgt. R. Emson; Sgt. B. Escritt; Flt. Sgt. K. R. Farmer; Sgt. J. C. Fell; Flt. Sgt. W. A. C. Footman; Flt. Sgt. G. W. H. Ford; Sgt. T. H. A. Forster; Sgt. N. L. Forth; Sqn. Ldr. E. C. Fyson; Sgt. J. W. Garland; P/O. D. P. Garroway; Sgt. J. Gorrie; Sgt. R. D. Gould; P/O. G. W. Goult, D.F.M.; Sgt. J. B. Graham; Sgt. A. Griffith; Flt. Sgt. J. L. Gurton; Flt. Lt. W. R. Hare, D.F.C.; Flt. Sgt. F. W. Harvey; Sgt. W. L. Holford; Sgt. R. T. B. Howe; Sgt. W. A. Hughes; Sgt. G. Ingle; Sgt. J. Jones; Flt. Sgt. C. H. Kent; Sgt. G. H. Kent; Flt. Lt. C. A. Kidd; W/O. S. A. Lagdon; Sgt. H. J. L. M. Lane; Sgt. J. R. Lees; Sgt. P. Lynch; Sgt. J. J. E. McCaffery; F/O. G. McClelland, D.F.M.; F/O. V. McConnell; Sgt. A. A. Mansfield; F/O. D. C. Martin; Flt. Sgt. L. C. G. Mayhew; F/O. L. F. Medway; F/O. D. H. Mills; Sgt. L. Mills; W/O. T. J. Mills; Flt. Sgt. G. T. Moody; F/O. R. W. Morrison; Flt. Sgt. W. A. Napier, D.F.M.; Sgt. D. P. Nash; Sgt. D. Naylor; F/O. J. W. Oakley; Sgt. E. Oldroyd; Sgt. C. Ostler; Sgt. W. J. Proffitt; P/O. H. I. Pryke; P/O. J. W. T. Purdy; Sgt. J. E. B. Pye; P/O. D. F. Read; Sgt. H. R. Reardon; Sgt. R. Redall; P/O. J. L. Richards; Sgt. F. C. Riley; Flt. Sgt. E. E. Roberts; P/O. F. D. Roberts; Sgt. K. Powley; Flt. Sgt. R. F. Scott; Flt. Lt. F. J. Sercombe; F/O. R. G. Sharland, D.F.C.; Sgt. J. Sharp; F/O. J. A. Singleton; F/O. A. J. Smith; Flt. Sgt. G. E. Smith; Sgt. E. G. Smith; Flt. Sgt. J. W. Sole; Sgt. W. Somerville; Sgt. R. F. Spanner; Sgt. A. Spray; Sgt. B. Stamper; Sgt. K. T. Staple; Sgt. T. A. Stevens; Flt. Lt. M. C. Stimpson, D.F.C.; Sgt. A. C. Stopp; F/O. F. A. Sullivan; Sgt. J. Swarbrick; Sgt. H. Taylor; Sgt. H. S. D. Tulett; P/O. J. B. Tweedie; F/O. J. A. Unwin; Flt. Sgt. H. S. Vickers; P/O. J. F. Ward; Flt. Lt. D. Warren; Sgt. J. E. Watson; F/O. A. J. S. Watts; Flt. Sgt. R. G. Watts; Flt. Lt. H. V. C. Webb; Sgt. P. A. Wenham; P/O. J. H. Wilkinson; F/O. D. T. Williamson; Flt. Sgt. D. W. Wood; Sgt. A. B. Woodbine; Sgt. W. Woodward; F/O. J. H. Wright, D.F.C.; Sgt. G. D. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Flt. Sgt. R. G. Bishop.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—F/O. A. Stewart.

WOUNDED OR INJURED IN ACTION.—Sqn. Ldr. P. V. K. Tripe, D.F.C.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—W/O. E. J. Edwards.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. W. D. Adams; Flt. Sgt. H. Dawson; Flt. Lt. R. J. Floyd; F/O. J. H. Nesbitt; W/O. A. T. Read.

MISSING.—F/O. R. B. Anderson; Flt. Lt. E. N. Armstrong, D.F.C.; Sgt. R. W. B. Baldwin; Sgt. D. A. M. Botterill; Sgt. W. Brand; Sgt. G. W. Brown; F/O. H. Burgoyne; Sgt. L. V. Chandler; F/O. G. B. Chapman; Sgt. W. Cheesman; Flt. Sgt. F. Chew; Sgt. J. W. B. Cockburn; Sgt. R. W. R. Cooper; W/O. S. W. Couttie; F/O. P. J. Cuff; Flt. Sgt. W. R. Dawes; Flt. Lt. W. E. M. Dean; Sgt. J. R. C. Duns; Sgt. C. F. Ednay; F/O. H. Ellis, D.F.C.; Sgt. C. R. Garner; Flt. Sgt. J. H. Gilbert; Flt. Sgt. J. H. Goddard; Sgt. W. G. Gunton; Flt. Sgt. A. Hampshire; Flt. Lt. I. G. Handyside; Flt. Sgt. E. Hardisty; Flt. Sgt. R. Harland; P/O. A. Hepworth; Flt. Sgt. W. P. Hughes; F/O. O. P. Hull; Flt. Sgt. D. Jackson; Flt. Sgt. J. Johnson; Sgt. A. Jones; Flt. Lt. G. A. Kendrick; W/O. D. Kirtley; Sgt. W. E. Lane; Flt. Sgt. M. Leyland; Flt. Sgt. J. MacFarlane; F/O. J. McGrath; Flt. Lt. R. H. McGregor; W/O. N. McKay; P/O. J. A. McMullin; Flt. Sgt. G. Malcolm; F/O. L. G. Mead; F/O. G. F. Mertens; Flt. Sgt. O. C. Moore; Flt. Sgt. F. Papple; Flt. Sgt. J. H. Peill; Sgt. J. Pollard; Flt. Lt. H. J. Pryor, D.F.C.; F/O. E. C. Redfern; F/O. E. J. Renelt; F/O. F. S. Renton; Sgt. L. G. Roberts; F/O. V. G. Sagar; Flt. Sgt. G. A. Sarson; Sgt. D. J. H. Sayers; Sgt. W. P. Scott; F/O. J. E. Sears; F/O. H. Shaw; Flt. Sgt. B. Sterman; W/O. H. M. Stevens; Sgt. T. F. Stewart; Sgt. M. W. Stobart; W/O. E. C. Temple, D.F.M.; Flt. Lt. R. C. Thorn; Sgt. G. Thomson; F/O. D. V. Turnpenney; P/O. G. W. Walker; Flt. Lt. H. C. L. White; F/O. J. A. Wickson; Flt. Sgt. J. W. Williams; Sgt. L. A. Williams; Sgt. H. R. Willicombe; Sgt. D. Winch; Sgt. K. D. Winstanley; W/O. A. L. Winston; Flt. Sgt. G. D. Wright.

KILLED ON ACTIVE SERVICE.—F/O. J. D. S. Barkell; Sgt. M. S. Card; Flt. Lt. R. Cooper; Flt. Sgt. H. E. Golding; W/O. G. Harvie; F/O. J. K. Langston; F/O. W. A. Lovatt; F/O. S. J. Margrie; A/C.1, T. E. Millen; W/O. T. J. Price; W/O. J. A. C. Russell; Sgt. J. Wiles; Sgt. E. G. Williams; Flt. Sgt. S. Wilson.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. R. H. Asplin; L/A.C. H. Knight.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. M. Allen; P/O. G. W. Beer; Sgt. J. H. Dunn; Sgt. G. Ellwood; Flt. Sgt. J. K. Hovell; Sgt. W. Lane; P/O. W. Stobbart; Flt. Lt. D. E. Walker.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. J. Dobie; Cpl. D. E. Evans.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Cpl. E. G. Evans; Cpl. L. G. Garland.

DIED ON ACTIVE SERVICE.—L.A/C. R. C. Fisher; A/C.1 D. R. Walford.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. J. O. Ackroyd; Sgt. R. F. Gannon; Flt. Sgt. K. W. Green; Flt. Sgt. W. H. Griffiths; Sgt. C. J. Hamilton; Flt. Sgt. M. S. Ludlow; Flt. Sgt. R. Penny; F/O. A. R. Tarlton.

A formation of R.A.F. R4B Sikorsky helicopters. Since these can hover or move in any direction, we suppose that at some future air display they will put on a show of inverted backwards flying in formation.

### Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION NOW PRESUMED KILLED IN ACTION.—Group Capt. J. R. Balmer, O.B.E., D.F.C.; F/O. P. J. Hammond; P/O. J. S. Woodhams.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. W. R. Chadwick.

MISSING, BELIEVED KILLED IN ACTION.—P/O. C. J. Dunshea; P/O. A. E. Winter.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. E. Hooper.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—F/O. M. T. W. Pain.

### Royal Canadian Air Force

KILLED IN ACTION.—F/O. L. G. Roberts.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Flt. Lt. H. J. Cleary.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. C. M. Brodie; Flt. Lt. K. D. Cox; F/O. D. G. Crawford; Flt. Lt. R. N. Earle; F/O. T. C. Gamey Flt. Lt. A. H. Harris; W/O. H. O. Irvine; Flt. Lt. J. A. Malloy; F/O. J. M. Potts; W/O. W. L. Washbrook.

MISSING.—F/O. J. C. Adams; F/O. J. G. Agnew; Flt. Sgt. W. E. Archer; Flt. Lt. L. W. Brand; P/O. V. C. Bullock; Flt. Sgt. R. C. Carnegie; F/O. W. R. Elcoate; F/O. M. G. Fife; F/O. M. C. Grant; F/O. K. W. Landers; W/O. J. C. McFee; Flt. Sgt. G. A. Noble; Flt. Sgt. C. T. Rielly; Flt. Sgt. L. E. Riggs; W/O. G. L. Rowe; Flt. Sgt. J. W. Vandenbergh; W/O. R. V. Weston.

KILLED ON ACTIVE SERVICE.—Flt. Lt. H. S. Luck; F/O. D. G. Tinkess.

# SERVICE AVIATION

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. L. R. Lauzon.

## Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. F. T. Culling-Mannix; F/O. K. G. Franklin; Flt. Sgt. N. J. McCook; Flt. Lt. D. C. Stewart; Flt. Sgt. L. R. Taylor.

## South African Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—2nd Lt. R. W. Rowan.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Lt. Hanson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Lt. Col. P. Loock.

### *Casualty Communiqué No. 507*

Of the names in this list, 189 are second entries giving later information of casualties published in earlier lists.

## Royal Air Force

KILLED IN ACTION.—Sgt. G. Fletcher; Sgt. D. S. Ford; Sgt. F. A. Kendall; Flt. Lt. M. J. M. Lagesse; Sgt. R. A. Quiney; Flt. Sgt. R. H. Thomson; Sqn. Ldr. R. F. L. Tong, D.F.C.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. R. Banner; Sgt. J. E. Garnsey; Sgt. S. Grove; P/O. E. G. Harman; Flt. Sgt. L. E. Hopkin; W/O. K. M. Hopley; Sgt. R. James; Sgt. A. Johnson; Sgt. J. Mawer; Sgt. W. H. J. Mills; Sgt. F. Parish; F/O. T. Rickland; Sgt. E. W. Webb; Flt. Lt. D. P. Will; Flt. Sgt. D. H. Williams; P/O. R. F. Woodiwiss.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. A. F. Abbott; Sgt. B. S. J. Akehurst; Sgt. T. C. Akeroyd; P/O. A. J. Alcott; Sgt. B. J. Allen; Flt. Lt. C. H. Armour; P/O. P. R. Aslett; Flt. Sgt. H. Aspinall, D.F.M.; Sgt. W. G. Baker; Flt. Sgt. F. W. Bartley; Sgt. A. E. Bennett; P/O. R. C. Bett; Flt. Sgt. J. W. Bott; Flt. Sgt. N. C. Bowker; Sgt. F. E. Bowler; Sgt. W. E. Brown; Flt. Sgt. A. Buchanan, D.F.M.; Flt. Sgt. R. G. Burton; Sgt. J. A. Byars; Flt. Sgt. J. Campbell; Flt. Sgt. E. Campbell; Sgt. L. F. Carr; F/O. G. D. Carroll; Sgt. G. A. Cartwright; Sgt. R. T. Charles; F/O. R. A. Chilcott; Flt. Lt. H. D. Churchill, D.F.C.; Flt. Sgt. R. W. Clarke; Sgt. R. D. Clement; Sgt. B. Cohen; Sgt. D. J. Coldicott; Flt. Sgt. G. E. Combe; P/O. H. B. Cooper; Flt. Sgt. A. I. Corlett; Sgt. W. H. Cotterill; Sgt. B. Coughlin; Sgt. P. J. S. Crawford; Sgt. R. D. Crook; F/O. J. S. Cross; P/O. B. S. Cubbage, D.F.M.; P/O. B. V. Cude; Sgt. J. R. Dalziel; Flt. Sgt. L. Darlington; F/O. J. C. H. Davies; F/O. P. G. Davis; Sgt. A. Davison; Sgt. F. W. C. Dean; Flt. Sgt. J. Dear; F/O. J. D. Dill-Russell; F/O. H. E. Dinnage; Flt. Sgt. L. J. Donaldson; P/O. J. A. Downs; P/O. T. S. Ecclestone; W/O. A. F. Edmonds; F/O. A. H. Ellis; W/O. H. Entwisle; Sgt. T. R. Evans; P/O. F. G. Forde; Sgt. W. D. French; F/O. M. W. Frith; Sgt. R. Giles; Sgt. T. H. Girven; Sgt. P. C. Gizzi; Sgt. C. Glen; Sgt. E. S. Goodridge; Sgt. E. C. Gornall; F/O. C. D. Gough, D.F.C.; Wing Cdr. E. J. Gracie, D.F.C.; Sgt. M. E. Green; Sgt. G. H. Griffiths; Sgt. A. W. R. Gross; F/O. J. Haddow; F/O. F. L. Hale; Sgt. P. Harris; Flt. Sgt. D. E. Harrison; Sgt. M. Hartley; F/O. W. E. Hemingway; P/O. W. Henry; W/O. J. F. Hewson; Sgt. P. Higgins; Sgt. F. Hilton; P/O. L. Holden; Flt. Sgt. T. Horton; Flt. Sgt. E. A. Howe; Sgt. F. W. Ingham; Flt. Sgt. J. D. McD. Jarvis; Flt. Sgt. H. Jackson; Flt. Sgt. H. M. Jennings; Sgt. D. L. Jones; Flt. Sgt. J. J. O'N. Kennedy; Sgt. D. Kenny; Sgt. B. Kenrick; F/O. R. Kidd; Sgt. L. Kirkham; Sgt. W. Lannigan; F/O. H. A. Litherland, D.F.C.; Sgt. S. Lucas; P/O. J. T. D. McLachlan, D.F.C.; Flt. Sgt. E. Marshall; Sgt. V. H. Mate; Flt. Sgt. E. A. Metcalfe; Sgt. H. G. Millard; Sgt. J. T. Morey; P/O. J. W. Morris; P/O. R. S. W. Morris; Flt. Sgt. W. D. Nichols; Sqn. Ldr. T. R. Nixon, D.F.M.; P/O. L. F. G. Noakes, D.F.C.; F/O. W. Norman; Sgt. P. J. A. O'Callaghan; Sgt. W. Oliver; Flt. Sgt. R. J. Paige; Sgt. E. F. Parry; Sgt. H. D. Patchett; Sgt. S. Percival; Flt. Sgt. R. Pinkett; Sgt. R. G. Potter; Sgt. A. R. Potts; F/O. J. H. Pullman; Sgt. K. W. Radford; P/O. J. W. Ralph; F/O. R. L. Reeves; Flt. Sgt. J. S. L. Reynolds; Sgt. S. W. Ricketts; P/O. J. Rodgerson; Sgt. D. M. Russell; Sgt. K. F. Scammell; Flt. Sgt. L. A. Scott; F/O R. W. Sharp; P/O. K. W. Sherlock; Sgt. J. H. Shimmin; Flt. Sgt. H. F. Smith; Flt. Sgt. J. Smith; Flt. Sgt. W. H. Smith; Sgt. R. J. Smith; Sgt. B. K. Sparkes; Flt. Sgt. A. W. Squires; Sgt. P. A. Staniland; P/O. D. R. Tait; P/O. J. W. Taylor P. T. Thompson; Flt. Sgt. K. R. Tidmarsh; Sgt. K. W. Tindall; F/O. N. G. Totty; Flt. Sgt. G. W. Traylor; Sgt. C. O. Tyler; Sgt. F. B. Vallance; Sgt. C. Wallbank; P/O. S. Waller; Flt. Lt. L. N. Walsh; Sgt. H. C. West; Flt. Sgt. R. W. Wheeler; P/O. C. J. Wheelhouse; Sgt. H. G. Williams; Sgt. D. Willsdon; Sgt. R. W. J. Wivell; P/O. G. A. Woodcock; Flt. Sgt. R. E. Woodger; Sgt. G. S. Woodrow; Sgt. P. W. Wright; F/O. J. H. Wyatt; P/O. L. A. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—P/O. J. Dodd; P/O. H. W. H. Kerbey; Sqn. Ldr. H. Paynter; Flt. Sgt. T. F. Riley.

**Not a blizzard photograph from the Alaskan highway, but the result of spraying 12,000 gallons of foam on to a burning Fortress in England.**

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—L.A/C. T. Bracegirdle; P/O. R. W. Holditch; L.A/C. T. Jones.

MISSING, BELIEVED KILLED IN ACTION.—F/O. L. S. Trail.

MISSING.—Sgt. E. C. Allison; P/O. W. K. Ashley; Flt. Lt. W. G. E. Becker; Flt. Lt. C. R. Birbeck; F/O. K. G. Booth; P/O. C. G. Broad; Flt. Sgt. C. Cash; F/O. M. J. Cheyney; Sgt. F. W. Clinch; Sgt. J. O. Cooper; Flt. Sgt. T. D. Cremins; Flt. Sgt. R. G. Cunningham; Flt. Sgt. D. Davey; Flt. Sgt. J. R. Ennor; F/O. N. Evans; Sgt. T. Fetherston; F/O. G. Floyd; W/O. C. H. M. Foster; P/O. P. J. Gray; Sgt. P. L. Greaves; P/O. H. E. Hastings; W/O. J. A. Hebdige; F/O. G. Hill; Flt. Sgt. E. J. Hobbs; Flt. Sgt. J. L. Holland; Flt. Lt. S. S. Jenkins; Sgt. J. R. Kennedy; Flt. Sgt. H. F. King; Sgt. D. F. Kirby; W/O. H. T. Large; Flt. Sgt. F. W. Lee; F/O. J. W. Lowrie, D.F.C.; P/O. J. L. McCallum; Sgt. J. Manning; Flt. Sgt. K. Mannion; Sgt. W. F. Merrick; Flt. Sgt. D. S. Mitchell; Sgt. S. B. Morgan; Flt. Sgt. G. A. Morton-Moncrieff; Sgt. W. E. C. Mount; Flt. Sgt. G. A. O'N. Oliver; Sgt. C. S. G. Poulton; Sgt. J. Powell; Sgt. H. Richardson; Flt. Sgt. J. M. S. Ritchie; Sgt. W. E. Ranger; Flt. Sgt. R. Roberts; Sgt. H. Taylor; Sgt. J. D. Thornton; F/O. F. P. Trautman; F/O. J. K. Turner; Sgt. K. J. Vincent; Flt. Lt. S. Walton; Flt. Sgt. R. Watt; Sgt. H. S. Webster; F/O. A. MacD. Young.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. N. C. Martin; A/C.1 R. W. Metherell.

KILLED ON ACTIVE SERVICE.—Sqn. Ldr. J. Arnsby, D.F.C.; Sgt. J. F. Barnes; Sgt. G. R. Best; Sgt. D. G. Burn; Flt. Lt. H. K. Clifford; F/O. R. Davies; Flt. Lt. E. D. Eyles; Sgt. C. H. Gilbert; Sgt. J. G. Hazelden; Sgt. J. W. Humphrey; Sgt. F. Lewis; Sgt. C. R. C. Mann; Sgt. J. Rawlinson; L.A/C. A. Reid; Flt. Lt. D. M. Reid, D.F.C.; Sgt. N. Thompson; Flt. Lt. D. L. Ward, D.F.C.; P/O. G. D. Wright.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—W/O. R. G. Holt.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. G. F. Ashby; L.A/C. T. Keay; Flt. Sgt. C. E. Morgan; Flt. Lt. H. I. Taylor; Cpl. W. L. Trundle; L.A/C. R. H. B. Wilson.

DIED ON ACTIVE SERVICE.—Cpl. H. Abbott; Sgt. J. Alexander; A/C.2 W. F. Bolton; L.A/C. E. Butterworth; Cpl. J. H. Casson; A/C.2 H. R. Clark; A/C.2 W. O. Dawns; A/C.1 R. Goodbier; Cpl. H. Graham; A/C.1 R. J. Gray; L.A/C. T. E. Keeton; Sgt. S. B. Kerley; A/C.1 S. Leeson; L.A/C. J. McManus; Sqn. Ldr. C. J. F. McRae; A/C.2 F. Morrow; L.A/C. F. A. Rendall; L.A/C. G. Riley; L.A/C. C. R. Smith; A/C.1 D. Tatham; Cpl. W. Thomas; L.A/C. F. Traynor; A/C.1 C. W. Wakely; F/O. W. J. T. Yardley, D.F.C.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. F. B James; Sgt. F. B. Newman.

## Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—L.A/CW. B. Baynes-Cope.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/CW. J. E. Turner.

## Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. W. H. Butt; Flt. Lt. A. W. Heitman; F/O. D. R. McIntosh.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. T. W. Kennedy.

MISSING.—Flt. Sgt. C. E. H. Barnfield; F/O. L. F. B. Barrett; Flt. Sgt. W. E. Boutcher; Flt. Sgt. N. C. Boyd; F/O. A. A. Christie; F/O. K. A. Cook; F/O. G. Fong; F/O. C. C. Gibson; Flt. Sgt. M. J. Kerrigan; F/O. G. M. Lumsden; Flt. Sgt. B. C. MacKnight; Flt. Sgt. J. E. B. MacLean; Flt. Sgt. M. J. McNamara; F/O. A. H. Nicol; Flt. Sgt. A. A. Robins; Flt. Sgt. N. G. Sandlant; Flt. Sgt. W. T. Simpson; F/O. W. R. Sinclair; Flt. Sgt. A. B. Tunnock; F/O. A. H. Williams; Flt. Sgt. H. L. Wilson.

KILLED ON ACTIVE SERVICE.—Flt. Lt. D. E. Ball, D.F.C.; Flt. Sgt. H. P. Forster; Flt. Sgt. F. Hutchinson; Flt. Lt. L. G. Sullivan, D.F.M.; Flt. Sgt. A. B. Thomas; P/O. I. L. V. Thompson

## Royal Canadian Air Force

MISSING.—W/O. R. W. Gibson; P/O. G. H. Kendall.

## Royal New Zealand Air Force

KILLED IN ACTION.—P/O. F. C. Matthews.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. A. D. McConnell.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Lt. F. C. Jones

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. J. D. Lunn.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—W/O. W. J. Swinton.

## South African Air Force

WOUNDED OR INJURED IN ACTION.—2nd Lt. W. J. Reid.

MISSING.—Lt. C. W. L. Boyd; Capt. B. G. S. Enslin; Lt. Janse Van Rensburg; Lt. H. J. Kritzinger.